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UNITED STATES DEPARTMENT OF AGRICULTURE
BULLETIN No. 305
Contribution from the States Relations Service
A. C. TRUE, Director

Washington, D. C. PROFESSIONAL PAPER November 11, 1915

EXERCISES WITH PLANTS AND ANIMALS FOR SOUTHERN RURAL SCHOOLS

By

E. A. MILLER, Specialist in Agricultural Education

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By E. A. Miller, *Specialist in Agricultural Education.*

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INTRODUCTION.

The purpose of this bulletin is to set forth simple exercises with plants and animals arranged after a monthly sequence plan for the first five grades in southern rural schools. The monthly sequence plan is followed so that plants and animals may be studied at a time when they are most interesting. The monthly exercises provide work for each of the first five grades of the public school. Practical exercises and field trips are suggested. If the best results are to be obtained each pupil should be required to have notebooks and keep records of the observations made and the information secured. In connection with each exercise correlations with other subjects are given. These are intended to be suggestive, but if the idea is followed out and supplemented the ordinary public school branches may be greatly vitalized. It is intended that this publication shall serve as an approach to the study of formal or textbook agriculture in the upper elementary grades.

It is to be understood that this is in no sense a textbook, but a guide for the teacher. There may be communities to which all the exercises given here are not adapted, but in that event they should prove sufficiently suggestive to be helpful to the teacher in planning work that may be substituted. Nothing definite is said concerning the place this work should take in the daily program, but it is suggested that the period of one or two regular classes be used once or twice each week. In other words, it need not be treated as an additional subject in the curriculum but for the sake of its own importance and the vitalizing influence on the other public school subjects this work should be substituted for one or two other recitations each week in the several grades.

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[1] Prepared under the direction of C. H. Lane, Chief Specialist in Agricultural Education.

Note.—This bulletin is intended especially for the use of rural school teachers in the Southern States.

All publications referred to in this bulletin may be had free while the supply lasts from the U. S. Department of Agriculture, Washington, D. C.

SEPTEMBER.

(Plate I.)

To TEACHERS.—The accompanying calendar is a suggestion. One similar to this should occupy a conspicuous place on the blackboard or on a large wall placard. The idea is to have each month some striking feature of nature or of farm life. The calendar may be prepared and decorated by the teacher, or a drawing contest can be conducted with the pupils, awarding to the winner the privilege of making and decorating the calendar.[1]

FIRST AND SECOND GRADES.

The work of these grades for the year consists of learning the names of the animals and plants of the community, giving special attention to birds as to where they live, what they eat, and their nesting habits, and to garden flowers and vegetables as to seasons in which they grow. Individual birds and plants are studied.

PLANTS.

Review.—Review the pupils in plants to ascertain what they already know.

Assigned work.—What seeds are being sown in the home or school garden this month—lettuce, radishes? What plants are up and beginning to grow—Irish potatoes, turnips? What plants are in bloom—late corn, okra? What plants maturing or ripening seed—onions, pepper, tomatoes, pole beans? How do these plants grow—on beds, rows? Do the vines or stalks run on the ground, stand erect, or are they supported by frames and poles?

Practical exercises.—Have pupils bring to school roots, leaves, flowers, and seed of garden plants for study. Mount typical specimens of each. (See Farmers' Bul. 586.)

The pupils of this grade should start two or three winter vegetables in the school or home plat. (See planting table in the Appendix.)

Make frequent trips to the school garden to study seed in process of germination and to learn the names of the parts of the plantlets.

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[1] The calendar suggestions were furnished by Miss Margaret McAdory, Manual Training Supervisor, Birmingham, Ala.

Correlations.—Correlate the work with language lessons by having the pupils tell orally short stories of their experiences in the garden planting seed, collecting specimens, and observing germinating seed. These short stories should be reduced to writing by pupils of the second grade and the work given a place in the class notebook. (See Pl. II.)

Outlines of leaves, roots, flowers, seeds, and fruits of plants studied should constitute the work in drawing.

ANIMALS.

Review.—Ascertain what the pupils of these grades know about birds and animals. Continue learning the names of animals and birds.

Assigned work.—Specialize in bird studies. List the names of birds that may be seen this month.

Study a few particular birds, such as the blue jay, the humming bird, the mocking bird, the bluebird, and the swallow. Do they reside permanently in your State? Do they migrate south? What do they eat? Where do they build their nests? Is there a reason for the nest being located as it is? What is the color of the head, the breast, the wings, the back, the tail? Do they hop or run, or both? Do they sing—character of note? Imitate.

Practical exercises.—Encourage birds to frequent school and home yards by putting at particular places lunch remnants, meat scraps, and broken grain. Make them "gentle" by feeding and kind treatment. Make trips to the school grounds, fields, and woods to observe the habits of the birds being studied. Make records of observations in the class notebook. The following is an example record:

The Bluebird.

1. Most bluebirds go south in winter. Some remain.
2. They collect most of their food from the ground—insects and weed seeds.
3. They build their nests in hollow stumps, posts, and rails, in gardens, fields, and orchards.
4. There are two special reasons for the location of their nests—to protect their young, and to be convenient to source of food.
5. Color: Head, blue; breast, brown; wings, blue; back, blue; tail, blue.
6. Bluebirds both hop and run.
7. Bluebirds sing.

Correlations.—Ample material abounds for correlation work. Listing birds seen this month, making records of observations, relating stories, oral and written, of experiences on observation trips furnish language lesson exercises. The best written work should have a place in the class notebook.

Make drawings of particular feathers and tracks of each kind of bird studied. The best drawings should be mounted in the class notebook.

THIRD GRADE.

In this grade the population studies in a general way are continued with all plants and animals. More particular studies are made with garden crops. Additional work with annual wild flowers and weeds is undertaken. Particular attention is given individual plants. The bird studies are continued in greater detail, and additional work is undertaken with domestic and economic wild mammals. Lessons with particular animals are outlined.

PLANTS.

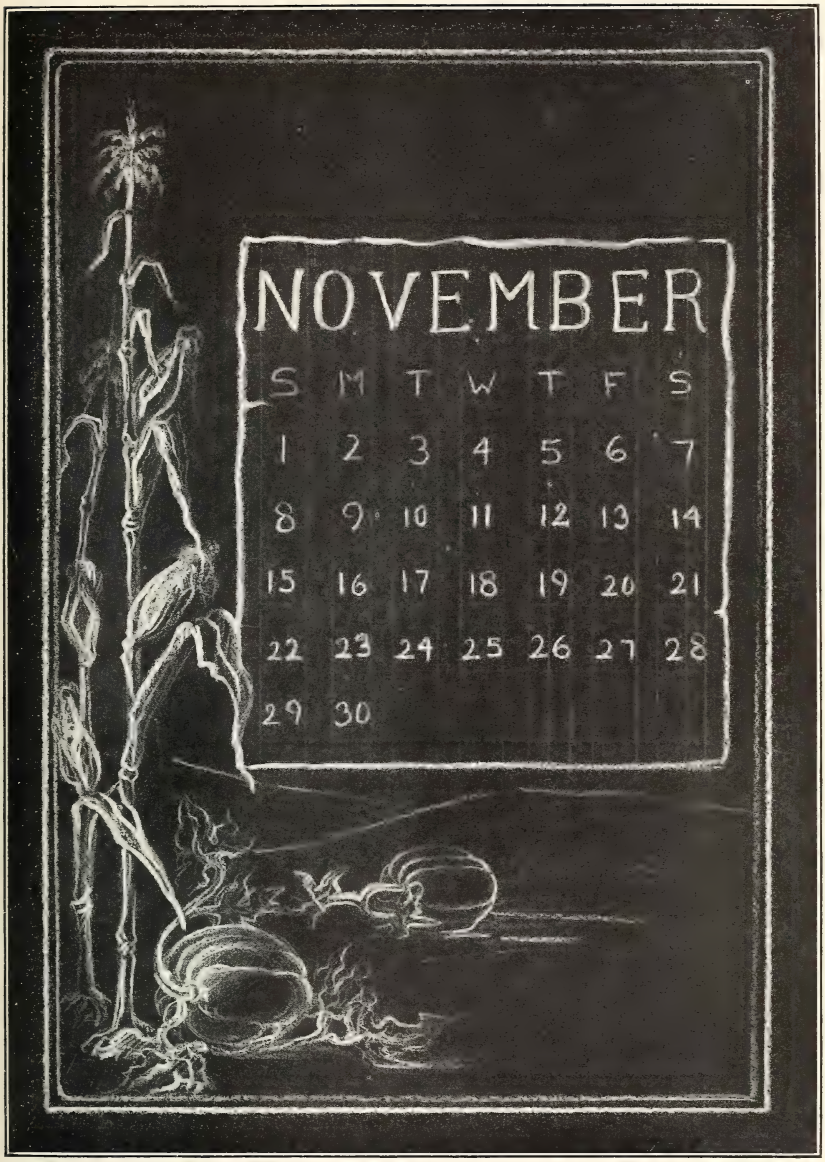
Review.—Review the pupils on recognizing at sight trees, flowers, and garden and field crops. This recognition work should be carried further than with the preceding grades. Trips to the forests and fields should be planned for this purpose. Children are easily interested in things that are attractive. Take advantage of this and direct their attention to plants that are attractive in foliage, flowers, or fruit this month. Have pupils make lists of trees, flowers, and garden and field crops they are able to recognize at sight.

Assigned work.—What garden crops are planted this month? Why can they be planted in the fall? Do they continue to grow during the winter months? What garden plants are blooming this month? When were they planted? Why? What garden crops are maturing seeds, roots, or tubers this month? When were they planted or transplanted? Were the plants started in the open or in hotbeds? Why? Will they grow during the winter months? How are their plants reproduced—by seed, roots, or tubers? If left to propagate themselves how would the seed be distributed? Answer these questions with regard to okra, tomatoes, sweet potatoes, and pole beans.

Are there any wild flowers or weeds blooming or ripening seed on the school ground, in the garden, on the roadside, in the pastures, or in the fields? How do they reproduce—by seeds, roots, or underground stems? How are the seeds scattered—attached to clothes of people or skins of animals, by bursting pods, by flying appendages, by birds, or otherwise? Answer these questions with regard to beggar lice, bitterweed, goldenrod, crab grass, milkweed.

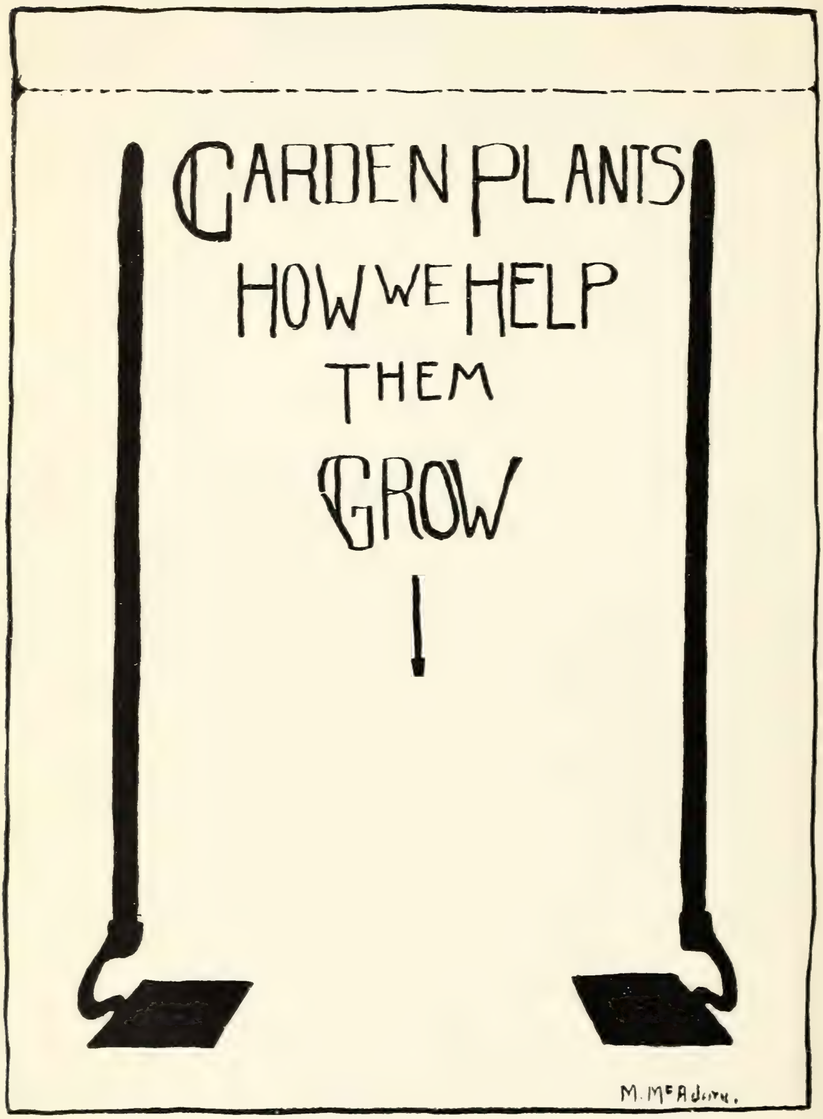
List and copy in the class notebook the names of wild flowers and weeds that bloom or mature seed this month. (If you can not learn the names of any that you find, mail them to the State agricultural college with the request that they be identified for you.)

Encourage pupils to have fall and winter garden plats either on the school yard or at home. While caring for the garden plats have them observe seeds in process of germination and learn to name and locate the parts of plants—roots, stems, leaves, flowers, seeds.



S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

BLACKBOARD CALENDAR SUGGESTION FOR A FALL MONTH.



SUGGESTIVE NOTEBOOK COVER.

Practical exercises.—Have pupils select from choice garden plants seeds that are maturing this month. Store seed in small paper bags in a place not subject to extremes of temperature and to the ravages of insects and mice.

Collect roots, stems, leaves, flowers, and seed of blooming and seed-maturing garden plants, wild flowers, and weeds. Mount the leaves and flowers in the class notebook. The roots, stems, and seed should be mounted on separate cards and labeled so as to indicate the name of the plant, the month collected, and the class making the collection. (See Farmers' Bul. 586.)

Correlations.—Language lessons: The trips in search of wild flowers and weeds afford material for written work. The location of a plant, its general appearance, the kind of leaves, flowers, and seed it bears, the manner of distributing its seed should form an outline for a written story.

Drawing: Sketch the roots, stems, leaves, flowers, and fruit or seeds of plants studied this month. The best drawing should be mounted in the class notebook.

ANIMALS.

Review and continued work.—Continue population studies.

Study birds more in detail. Are there new birds to be seen this month? Are they seen in flocks or alone? What do they eat? Do they go farther south or remain for the winter? Begin to look for the bobolink, or rice bird, and the field lark. What member of the class will be the first to report the appearance of a new bird?

Some or all of the following birds will seek a warmer climate during the winter: The cuckoo or rain crow, catbird, martin, kingbird, night and sparrow hawks. They should be given attention before they go away. Compare the males and females. Which are bright? Which dull? Can you give reasons? Uses of feathers on different parts of the body—shedding water, warmth, flying, balancing in air and on perches, propping on trees.

Compare the feathers on the neck, breast, back, wing, and tail of a chicken with those of some other farm fowl—turkey, goose, or guinea. Learn the parts of a feather—quill, barb, and barbel.

New work assigned.—Begin the study of domestic and wild mammals (animals that suckle their young) that are of economic importance this month. What domestic mammals are rendering service? Idle? Gathering their own food? Being fed?

What wild mammals are destroying or damaging garden or field crops? Does the damage done justify their extermination? Are they useful for game?

Answer the following questions with regard to the animals you select for study: Where do they live now? What is the winter home of each? Do they continue active during the winter or do they hibernate (go into winter quarters)? What do they eat? How do they obtain food?

Practical exercises.—Make trips to study animals and list those studied and record the facts learned in connection with each. Best records should have a place in class notebook.

Correlation.—Language lessons: Write stories on the use of feathers and on the habits of mammals studied this month.

Drawing: Sketch animals studied this month and mount the best ones in class notebook. Find pictures of animals in farm papers and mount in the class notebook.

FOURTH GRADE.

In this grade population studies are continued with plants and animals. The advanced plant studies include field crops and domestic and wild shrubs. The special studies with birds and mammals are continued and additional work with toads and a few common insects is taken up.

PLANTS.

Review and continued work.—Continue the practice in recognizing trees, domestic and wild flowers, garden and field crops. The plants that are especially attractive at this season should be given attention. It is easier to associate names with striking features. Make trips and give reviews often. As new plants are learned add names to the list.

New work assigned.—What field crops are planted this month? Why should they be planted in the fall? Oats? Wheat? Rye? Crimson clover?

What field crops are in bloom this month? When planted and why?

Make a list of all field crops that are planted or that are blooming and maturing seed this month.

Practical exercises.—Select choice seed from field crops and shrubs and store for study or planting. If the seeds are not sufficiently matured to gather, mark them to be gathered at a later date. Seed for identification study should be mounted on cards or placed in screw-capped bottles and labeled.

Gather the matured garden crops, clear away rubbish, and begin preparing soil and planting fall crops. Insist on all pupils of this grade having a garden plat either at home or at school. (See suggested garden crops for this season in Appendix.)

The interior of the schoolroom should be tastily decorated with plants bearing fruit and seed from the gardens and fields. Have pupils bring these to school and assist in decorating. Vitalize the school work by giving the schoolroom an atmosphere of the products of life processes.

Correlations.—Language lessons should consist of stories and descriptions concerning the plants studied, the garden work done, and the fruit and seed collections mounted and stored.

Ample material for drawing lessons is provided by the plants, leaves, fruit, and seed studied this month.

Geography: Simple lessons in distribution of crops may be drawn from such questions as: What crops or parts of crops studied this month are consumed by the family? By the animals and poultry? Are sold for community use? For shipment to other sections? (Blackboard exercise.)

The studies should be correlated with history by simple lessons on the crop under consideration as suggested by the following questions: What plants have been grown in the community a long time? Recently introduced? What shrubs are native? Which introduced? Which have been domesticated a long time? Which recently? (Blackboard exercise.)

Gather data and state problems on cost of production, value, and estimated yields per acre of crops studied this month.

ANIMALS.

Review and continued work.—Birds: Continue the population studies. For advanced work, group the birds you have been studying according to their methods of catching insects. Do they climb over buds, leaves, and limbs looking for insect eggs? Do they search on the ground for cutworms, crickets, and grasshoppers? Do they look among the branches and leaves for caterpillars or do they perch in some open place and dart into the air after flies and beetles?

Mammals: Continue the study of domestic and wild mammals, as indicated in the outline for the third grade.

New work assigned.—The toad is of inestimable value to man in the destruction of harmful insects of garden, orchard, and field. Children should be taught that this homely amphibian is a real friend and that it should be protected in every way possible. The toad will soon go into winter quarters, so the pupils should be encouraged to observe its habits. (Farmers' Bul. 196.)

Some attention should be given to some of the more common insects, such as the boll weevil, the cattle tick, the house fly, the potato beetle, and the white fly. Where common, bring them to school, learn to identify them, become familiar with the injury they work, and note the ways in which they are active during the month.

Practical exercises.—Locate one or more toads in the school yard, home yard, garden, or orchard. Watch closely this month. Is the coat or skin shed? What time of day is the toad moving about? What kind of tongue has the toad? Does the tongue differ from those of other animals in shape? In the way in which it is attached? How is the tongue employed in catching insects? What insects does the toad eat? Feed it live snails, thousand-legged worms, spiders, grasshoppers, crickets, beetles, cutworms, army worms, tent caterpillars. How does the toad differ from the tree frog? (Farmers' Bul. 196.)

Collect a number of quart bottles with as large mouths as possible. Place in one of these cotton squares with specks on the side that have just been shed, cover with some thin cloth and observe them daily and study the developments. (Farmers' Bul. 512.)

In another bottle place orange or grapefruit leaves that have white dust, small scale-like specks smaller than a pinhead; thick, round-bodied grubs with very short legs and with a bright red spot on the back, or small white flies attached to the under surface. Study developments.

In another bottle place fall Irish potato vines that are infested with beetles. Study daily to become familiar with the various stages of development. Fresh leaves should be added from time to time to furnish food.

Attempt to answer these questions:

(1) Where do house flies breed?
(2) How long do they require to develop?
(3) How many generations are grown in a season?
(4) How are they dangerous? How prevented?

(Farmers' Bul. 679.)

Mount specimens of insects studied this month. (See Farmers' Bul. 606.)

Correlations.—Language lesson material is abundant. Describing the toad, its habits and means of livelihood and recording observations with the insects studied provide ample subject matter for written work.

Drawings of the toad and the different stages of the insects studied should be made.

Exercises based on estimates of the number of insects destroyed annually by the toad, the number of descendants from one house fly, one boll weevil, one white fly, or one cattle tick in a year, and on estimates of the damage done to the various crops by the descendants of one of these insects in a year provide interesting correlation in arithmetic. (See references for estimates.)

Locate counties freed of cattle tick. Locate on the map the point at which the boll weevil was introduced into this country. Indicate on the map the part of the South infested with the boll weevil.

FIFTH GRADE.

Population studies in plants and animals of all kinds are continued. Advanced studies with orchard and forest trees are taken up. Some more detailed work with mammals and birds is undertaken and special attention is given to economic insects and fungus growths.

Review.—Review the pupils of this grade on the plant population of the community. They should be able to recognize at sight those plants that have been studied by pupils of the lower grades.

New assignment.—Give special attention to orchard and forest trees. Locate and name those that are ripening fruit or maturing seed. Having listed and located the foregoing designated plants, study them to be able to answer the following questions: What are the parts of the trees? In what location—hill, hollow, swamp, ledge of rock—do they flourish? What are the uses of the wood, sap, fruit, seed?

For study throughout the year select a striking tree of economic importance on or near the school yard and begin this month to make observations, take notes, and make drawings along the lines indicated by the following: (1) Outline drawing, accompanied by written description of the tree as it appears this month; (2) outline of a small branch, showing how leaves are attached—long or short stem, opposite or alternate; (3) outlines of leaves, with descriptions to show the relative sizes of leaves from different parts of the tree. Show the color of upper and lower surfaces, the arrangement of veins, and the kind of margin. (The foregoing should be followed throughout the year in the study of the tree selected.)

Practical exercises.—Collecting and mounting leaves, seed, and small specimens of wood of the trees being studied this month and learning to identify them should constitute a part of the practical work. (See Farmers' Bul. 586.)

A large chart should be prepared and placed in a conspicuous place on the wall of the school for recording (phenological) observations. Its purpose should be explained, and the pupils of all grades should be encouraged to assist in gathering data. (For sample chart and explanation see Appendix.)

Every pupil of this grade should have a garden either at school or at home. Gathering vacation crops, clearing away rubbish, preparing and fertilizing the soil, and planting fall and winter crops should occupy the attention of the pupils. Crops should be planted that can be consumed or gathered in time for planting early spring gardens. (For suggested crops see Appendix.)

Correlations.—Language: Write descriptions covering practical exercises with plant studies.

Drawing: Make drawings of the specimens of wood collected. Colored crayons should be used to indicate proper shade of the different parts of the wood.

Geography: Make an outline map of the school district and indicate the locations of orchards and considerable groups of forest trees that have been given special attention this month.

History: Have members of the class prepare statements of the facts as to the kinds of forest and fruit trees that have been and are dying out in the community, and, if possible, state reasons.

Arithmetic: A simple method for determining the number of feet of lumber in a log is: Subtract 4 inches from the diameter of the small end to allow for slab, multiply the remainder by one-half itself, then by the length of the log in feet, and divide by 8.

(1) Find the number of feet in a log 24 inches in diameter and 16 feet long.
(2) A tree is cut into three logs each 12 feet long. The diameters for the smaller ends are each 36, 30, and 24 inches. Find the number of feet of lumber in the tree.

ANIMALS.

Review and continued work.—Population studies of all kinds of animals, birds, and insects are continued.

Begin the study of a particular group of birds, say, the woodpeckers or sparrows. Follow this study month by month. Some of the more common woodpeckers are hairy woodpecker, downy woodpecker, flicker or yellow hammer, red-headed woodpecker, and yellow-breasted sapsucker. The following outline is suggested as a guide to group study for the year: (1) General form, size, and appearance of each member of group; (2) color—back, head, throat, breast, tail—both of males and females; (3) methods of each in procuring food and what is eaten; (4) manner of climbing and descending trees; (5) use of beak. What is the drum, and how and when used? (6) Holes—kinds of trees, location, extent, uses; (7) manner of flight; (8) resident or migrant, time of arriving and leaving; (9) places frequented—woods, fields, yards, swamps; (10) kinds of songs, notes, etc.; (11) useful, how? Harmful, how?

Begin a month by month study of a particular group of wild mammals, such as squirrels. The squirrel family includes the gray squirrel, the red squirrel, the ground squirrel or chipmunk, and the woodchuck or "ground hog." The following outline suggests observations and studies for the year with any group of mammals it is convenient to consider:

(1) General form and size of each animal of the group.
(2) Color of different parts—head, back, tail, under surface.
(3) Characteristic parts peculiar to each member of the group or to the group as a whole—teeth, toes, and tail.
(4) Manner of moving—on ground, climbing and descending.
(5) Where they make homes—in hollow trees or logs, in burrows, under banks or rubbish.
(6) What places they frequent—gardens, orchards, fields, woods, barns, and houses.
(7) What do they eat? Manner of procuring food?
(8) Do they store a supply of food for winter, go into a dormant or sleeping stage, or gather food in winter?
(9) Are they useful? How? Harmful? How?
(10) What are their natural enemies?
(11) If harmful, how may they be combated? (Yearbook Separate 491, Use of Poisons for Destroying Noxious Mammals, Yearbook 1908, p. 421.)

New assignment.—Give special attention to insect pests and fungus diseases of gardens, orchards, fields, and forests. During this month many of these are especially active making preparations to send a large number of pupæ and spores through the winter months. Insects and fungus diseases that are not recognized should be sent to the State college of agriculture for identification.

Insects found should be studied to learn their life history; that is, appearance of the egg and where deposited, the appearance of the larva and the proper common name to be used for it (grub, caterpillar, or maggot), the length of time spent in that stage, the damage done, and means of destroying; the appearance of the pupa or dormant stage, places in which found, the time spent in this stage, and the methods of destroying; the appearance of the adult and its common name, the places it frequents, the damage done, if any, where it deposits eggs, and methods of destroying.

Have pupils of this grade study and make reports on insects in any stage found during this month in the gardens, orchards, fields, and forests. Parts of plants being attacked should be brought to study the damage done. In the gardens look for cabbage and collard worms, potato beetles; in fields look for the boll weevil, the cotton caterpillar, and the cotton bollworm, the grass or corn worm; in orchards look for the San José scale and the white fly (where citrus fruit is grown); also look for the cattle tick.

The pupils should study and report on fungus diseases. Note the appearance of affected parts, the character of the damage done, and methods of combating. Look for tomato blight, potato blight, potato scab, apple scab, apple black rot, apple bitter rot, sooty mold of citrus fruit and shrubs, fire blight of apple, pear, and quince, cotton boll rot, and corn smut. (See Farmers' Buls. 243 and 440.)

Correlations.—Keeping records of studies with birds, mammals, insects, and fungus diseases and describing the damage done by insects and fungi furnish ample material for written work. Best records and descriptions should be given places in class notebooks. (See Pl. III.)

Drawings should be made showing the different stages of the life history of insects, the damage done to plants attacked by them, and the appearance of fungus diseases on plant parts attacked by them.

These studies may be correlated with geography by making a map of the school district showing the places in which damage is done by insects and fungi. This map should be preserved to be filled in with the results of the studies in the other school months.

Noting the insects and fungi that are native and those that have been introduced, recording the dates of introduction in the case of those that have been introduced, and writing accounts of damage done in each case are suitable for correlation with history.

Problems based on estimates of insects destroyed by different birds studied, and on the damage done by insects and fungi to the garden, field, and fruit crops of the community can be used to supplement the work in arithmetic.

OCTOBER.

FIRST AND SECOND GRADES

PLANTS.

Review the work of September.

Assigned work.—What garden crops are being planted this month—fall radishes, spinach, onions?

(1) Do you plant radish seed in rows or on a bed?
(2) What portion of the radish is eaten?
(3) Do you plant spinach seed in rows, on bed, or broadcast?
(4) What portion of the plant is eaten?
(5) From what are fall-planted onions grown—seed, bulb, set?
(6) Are onions planted in rows, on beds, or both?
(7) What part of the plant is eaten?

Answer similar questions for other garden crops being planted at this time.

(1) Are early-planted turnips and fall potatoes ready for use?
(2) Bring specimens to school if none are in the school garden.

Practical work.—Get some boxes and fill in a thick layer of small stones or cinders, on top of this place a thick layer of loam or leaf mold, on this a layer of clean sand. Set in the sand hyacinth bulbs 3 inches apart each way. Cover the bulbs with a layer of mold, leaving only the tops exposed. Cover with straw or an old sack. Keep in a cool place and water occasionally. After four to six weeks remove the straw or sack, keep in a warm place exposed to morning sun. Water and watch growth.

Continue to care for the school or home garden plats.

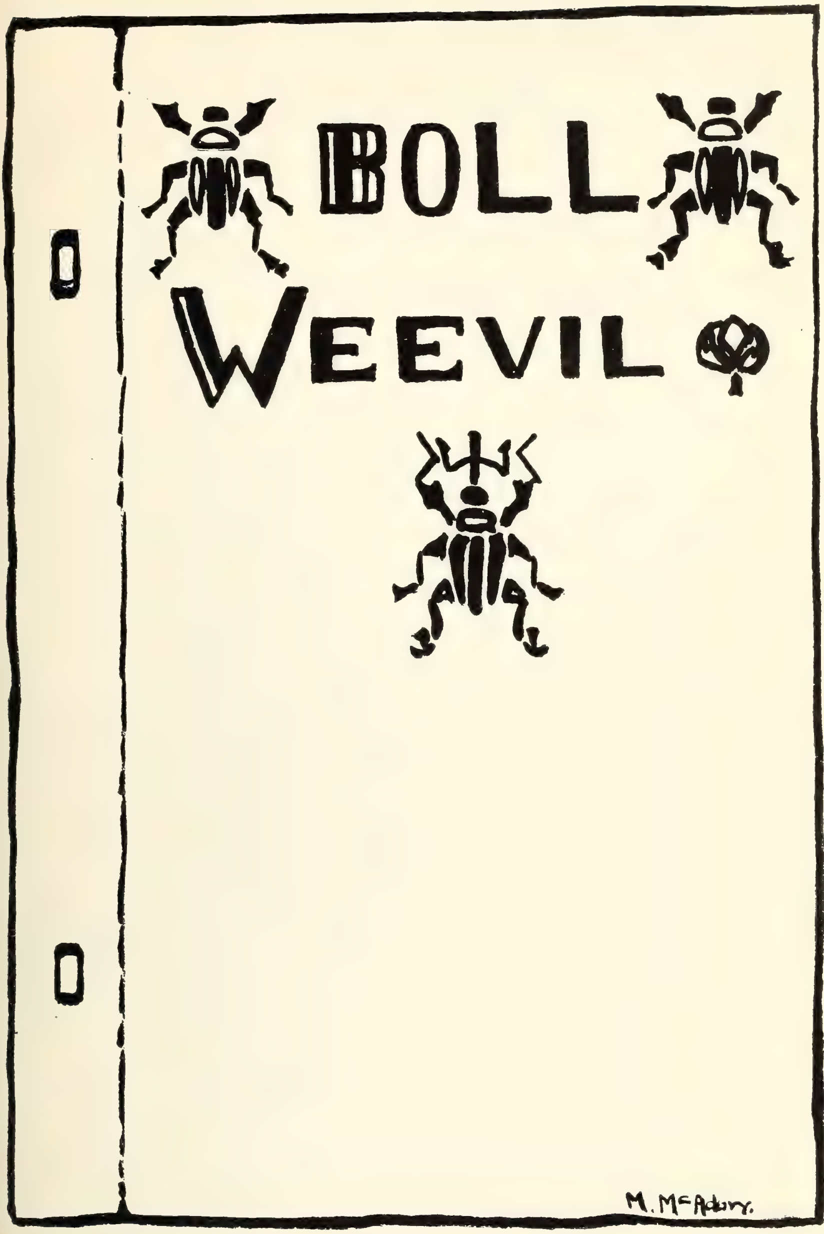
Correlations.—Language: Require pupils to relate the story as to preparing and planting hyacinths; also relate their experiences in their garden plats. These narrations should be reduced to writing.

Drawing: Make drawings of sweet potatoes, Irish potatoes, and turnips. Outline turnip and Irish potato leaves.

ANIMALS.

Review the September bird studies. All of the birds suggested for that month have not migrated yet. Become familiar with their habits before they leave.

Assigned work.—(1) Be on the lookout for new birds—(a) winter residents, those that spend the winter; (b) transients, those that are en route to warmer climate. (2) Note the disappearance of any of the summer residents; some will be leaving the latter part of October.



SUGGESTIVE NOTEBOOK COVER.

(3) The following birds are permanent residents: Flicker or yellow hammer, bobwhite, cardinal or redbird, dove, tufted titmouse, screech owl, wild turkey, American crow, red-eyed vireo, white-breasted nuthatch, house wren, brown thrasher, song sparrow, chipping sparrow, English sparrow, barn owl, red-tailed hawk, blue darter (hawk), killdeer. (4) Select two or three of these for study this month. Follow this outline in studying them and making records:

(1) What is eaten this month?
(2) Roosting place?
(3) Color of parts—head, breast, wings, back, tail?
(4) Hop, run, or both?
(5) Character of song—imitate.

Practical work.—Trips to the places frequented by these birds are necessary. Make records of observations as suggested in the foregoing paragraph and copy in the class notebook.

Correlations.—Language lessons are provided by making records of observations. These notes should form the basis of oral narrations.

Drawing: Make sketches of birds studied.

Reading: Read to the class stories of the bobwhite and other birds studied this month, found in Farmers' Buls. 54 and 630.

THIRD GRADE.

PLANTS.

Review the work of the preceding month. If the school term did not begin in September take up as much of the work outlined for that month as is practicable and connect it with the work in October.

Forest trees are putting on gay colors and are dropping nuts this month. Take advantage of those attractive features to familiarize the members of the class with the names of such plants. Note the general appearance of these trees and such particular features as bark, leaves, and nuts. Third-grade pupils should become familiar with the appearance of all field crops that are maturing seed. Are there any members of the class who do not know at sight the plants and seed of corn, cotton, peas, chufas, soy beans, velvet beans, peanuts, and sorghum?

Assigned work.—Have pupils report to class the names of garden crops that are being planted at the homes. Onions? How are such crops planted—in rows, in beds, broadcast? When are such crops expected to be ready for use? What parts—root, stem, seed—are used for food? What parts planted?

What fall garden or truck crops are ready for use or to be harvested this month—Irish potatoes, sweet potatoes, parsnips, others? How and where grown? What parts of the plants are used for food?

Are there any wild flowers or weeds blooming or maturing seed by the roadside or in the field, orchard, pasture, or garden this month? Answer the following questions and record in the class notebook: Name? Where found? Kind of blossom, if any? Appearance of seed? How scattered—by wind, by animals, by birds, by water or by being attached to clothing of people or skins of animals? Which are harmful? Which useful? Keep accurate records of all plants named and studied. Any flowers or weeds you are unable to recognize pack securely and mail to the State college of agriculture with the following letter:

GENTLEMEN:

I am sending to you by this mail securely packed a plant found by pupils of my school. Kindly give us the name, and state whether it is troublesome or useful.

Very truly, yours,

——— ———.

Practical exercises.—Select and mount garden seeds, wild flower and weed seeds maturing this month. (For instructions see Farmers' Bul. 586.)

Plant fall onions in the home or school plats. Care for the young plants in the garden and observe their parts—roots, stems, leaves. (See planting table in Appendix.)

Correlations.—Language lessons: Short written narrations and descriptions are features of practical exercises covering such points as where seeds were found, method of scattering, and general appearance. Garden notes form the basis for short written stories.

Drawing: Make drawings of the wild flowers and wild seeds studied this month. Sketches showing the parts of young garden plants should be made.

ANIMALS.

Review.—Continue the work of learning at sight the names of all kinds of domestic and wild animals and birds. Keep a record of the birds that leave this month. Some few will seek a warmer climate. Be on the alert for the arrival of new birds. These are of two kinds—those on their way south and those that come to spend the winter. Do they travel in flocks or alone? What do they eat? Among the transients look for the ruby-crowned kinglet and the hermit thrush. Among the winter residents look for yellow-bellied sapsucker, downy woodpecker, purple finch, and phoebe. (See Farmers' Buls. 54 and 630.)

Continue the study of the use of feathers on the different parts of the body—shedding water, warmth, flying, balancing in air and on perches, propping on trees.

New work assigned.—The cow is one of the most useful animals and should be given the very best treatment. Study the cow this month to be able to answer the following questions:

(1) In what way is the cow useful?
(2) What things does she like to eat?
(3) How does she get food into her mouth?
(4) Has the cow upper front teeth?
(5) What takes the place of the upper front teeth? Crackled pad.
(6) How does the lower jaw move in chewing?
(7) Examine the lower front teeth of the cow. Do they seem loose? Can you find a reason?
(8) Does the cow stop to chew grass as she grazes?
(9) What is the cow's cud?
(10) Have cows as many toes as people?
(11) How many true toes has the cow?
(12) How many useless toes has the cow?
(13) How are the toes of the cow protected?
(14) What means of defense has the cow?
(15) Does the cow get up on her hind legs or front legs first?
(16) How do you call your cow? Imitate.

What wild mammals are destroying or damaging garden or field crops this month? Does the damage done justify their extermination? Are they useful for game?

Practical exercises.—Watching for the coming of new birds, recording the disappearance of the summer residents and studying the cow at home with the view of answering the questions suggested in the foregoing outline will keep pupils busy and interested. All facts learned should be recorded in the class notebook.

Correlations.—Language lessons: Ample written work is provided in keeping records for the month.

Drawing: Make drawings of the cow's foot, ear, horn.

FOURTH GRADE.

PLANTS.

Review.—Continue population studies and review the work for September.

New work assigned.—Are any of the farmers of the community planting oats, wheat, rye, or clover this month? How planted—in rows or broadcast? Can the pupils tell why these crops are planted in the fall? What are the uses of these crops? When should they be ready for use, if planted now?

What field crops and domestic and wild shrubs are maturing seed and ripening fruit this month? Corn? Cowpeas? Peanuts? Chufas? Soy beans? Pumpkins? Red haws or "thorn berries?" In case of the field crops, when was each planted? From what part of the plant grown? How planted—in rows or broadcast? How are the different parts of each plant—root, leaves, seed—used? If left alone, how would each kind propagate itself? In case of domestic or wild shrubs, what are the uses of the different parts of the plant? If a domestic plant, how is it propagated—from seed, cuttings, or grafts?

Practical work.—List all plants studied and record the facts indicated in the above questions in class notebook.

Collect seed from the different field crops and mount and label. Seeds or fruits of shrubs should be collected, mounted, and labeled. In case of fruits they should be thoroughly dry before storing or mounting.

Keep the schoolroom decorated with field crops.

Correlations.—Language lessons: Making records of the practical work and descriptions of plants and their uses provide sufficient written work.

Drawing: Make drawings of ears of corn, pea and bean pods, pumpkins, fruits, and seeds of shrubs.

Geography: Have pupils make a product map of the school district. Outline the district as accurately as possible and paste on seed of the different kinds of crops being planted or harvested this month.

Arithmetic:

(1) Examine an ear of corn of average size. How many rows has it? How many grains per row? How many grains per ear? How many grains in a pint measure? How many grains per bushel?

(2) Add two more rows to the ear. How many grains would these add? How many such rows would be required to make a bushel?

(3) By selecting his seed a farmer added 5 grains to each row on the ear. If each ear has 16 rows, how many grains are added to each ear? From how many such ears would this number of grains have to be shelled to fill a pint measure?

(4) From the foregoing statements develop other exercises.

ANIMALS.

Review and continued work.—Keep up the annual population studies. Before they leave for the winter, classify all the birds that are summer residents according to their manner of catching insects. As new birds arrive observe them carefully and classify them in the same way. The four methods are: (1) Climbing over buds, leaves, and limbs for insect eggs; (2) searching on the ground for cutworms, crickets, and grasshoppers; (3) looking among leaves and branches for caterpillars; and (4) perching in some open place and darting into the air after flies and beetles. Keep records of the work in class notebook.

This is the season of abundant food supply for all kinds of animals. Wild mammals are grouped into three classes according to the manner in which they make provision for the winter: (1) Those that store up nothing for winter, like the rabbit and fox; (2) those that collect a large supply and store it away in a hollow tree or in a burrow, like the chipmunk or ground squirrel; and (3) those that consume a great deal of food at this time and lay on sufficient fat to enable them to sleep all the winter, like the ground hog.

Study as many of the animals of your community as possible this month and classify them under one of the three heads.

Assigned work.—The ant and the bee are quite similar in some respects. They are making preparations for the winter. In the early part of October attention should be given to these busy little creatures. Valuable lessons can be learned by the pupils from their industry and organized efforts.

The ant community or nest consists of: (1) Workers, which are wingless, and the ones commonly seen; (2) queens, or females, usually one or few at best in a nest and never seen except at mating time (the queen is much larger than the workers). At first they have wings, but after collecting a colony about them they tear their wings off and begin laying eggs; (3) males, smaller than queens, also have wings, but are short-lived and are not seen about the nest except at mating time; and (4) "soldiers," a kind found among some ants which are recognized by their large jaws.

In the latter part of September and the first part of October the young queens and males come out of their nests to mate. Some communities or nests of ants should be located and watched carefully for the purpose of studying the males and queens when they come out.

The workers should be observed to note what preparations they are making for winter in the way of supplying food and arranging their nests. (Reference: Bureau of Entomology Circ. 34.)

The beehive consists of: (1) Workers, the ones usually seen; (2) the queen, one in a hive much larger than the workers, which lays the eggs; and (3) males or drones, smaller than the queens. They mate with the queens in the fall and then die.

Bees should be studied at this time to become familiar with their methods of getting ready for the winter in the way of collecting honey and preparing their hives. (See Farmers' Buls. 442 and 447.)

Practical exercises.—The pupils of the fourth grade must keep their eyes and ears open at home, in the fields, on the way to school, and on the school grounds to learn the things suggested as animal studies this month. The teacher should plan a few trips to the woods and to the home of some one in the community who keeps bees. Let some pupil bring a small bit of honey to school and place at a convenient place outside the building. Watch the bees that visit it.

Correlations.—Making records of the bird and animal groups, and writing stories of the ant and bee provide ample practice in language work.

Drawing: Make drawings of the different kinds of ants and bees.

Geography: Fill in the plant product map of the district with pictures and drawings of the wild mammals studied this month.

Arithmetic:

(1) Some queens lay as many as 5,000 eggs per day. In how many days can a queen lay a sufficient number of eggs to produce a hive of 20,000 bees?

(2) One bee can visit on an average of 15 blossoms per minute. How many can it visit an hour? Day?

FIFTH GRADE.

PLANTS.

Continued work.—The pupils of the fifth grade should keep up with the population studies of the various kinds of plants engaged in by the pupils of the lower grades. Have the more advanced pupils form the habit of sending specimens of unknown plants to the State college of agriculture to be named.

New assignment.—Have each pupil make a list of the different varieties of the late fall apples in his or her home orchard and bring to school a few specimens of each. Learn to recognize the fruit of the different varieties. In studying each variety observe the following points: (1) The prevailing size, (2) the characteristic shape, (3) the prevailing color of the skin with the special markings, (4) the thickness of the skin, (5) the flesh of the apple—firmness, color, characteristic taste, and (6) winter keeping qualities. Record in the class notebook the names of all the fall apples grown in the community and the facts learned pertaining to them.

Have the pupils prepare a list of all the domestic and wild plants in the community bearing ripening nuts, such as black and English walnuts, pecans, and different varieties of hickory nuts. Have specimens of each brought to school and learn to recognize them at sight. Study the outside hull—color, thickness, shape; the whole nut—shape, color, density or hardness of shell; kernel—general shape, color, taste. Take notice of location in which each kind or variety of nut prefers to grow. Record all the foregoing facts in the class notebook.

Continue studying the particular tree selected on or near the school yard. (1) Make a new outline showing the general appearance of the tree this month. If the leaves are colored this effect should be given to the outline by use of crayons. (2) Individual leaves should be outlined and properly colored. (3) Drawings should be made showing all the parts of the seed. Written descriptions should accompany the outlines and drawings. This month's study should occupy a place in the class notebook. (Remember that the studies with trees are to be continued through the year and all records for each month should be carefully preserved in a well-bound notebook.)

Practical work.—Collecting material for the foregoing studies affords ample practical work. Specimens of all the different kinds of nuts found in the community should be placed in large bottles with large mouths and labeled for future study.

Correlations.—Language exercises in abundance are afforded in keeping records and writing descriptions of the work outlined for the month.

Drawing: Properly colored drawings of apples, nuts, and parts of nuts should be made. Additional work in drawing is suggested in the study of an individual tree.

Geography: In connection with the geography lesson study the uses of the nut-bearing trees of the community, especially walnut and hickory.

History: If pecans or English walnuts have been introduced into the community, have members of the class prepare statements covering these points: Date introduced, by whom, difficulties met with in their growth and the general success with which they have been grown. If neither of these nuts has been introduced, have members of the class prepare statements covering the history of the devastation of the hickory or walnut timber of the community.

Arithmetic: By counting the number of pecans, walnuts, hickory nuts, etc., in a small measure determine the number in a bushel. Approximate the number produced by some of the trees in the community. Develop exercises on the value of the crops of nuts produced by different kinds of nut-bearing trees in the community.

ANIMALS.

Continued work.—Population studies with all kinds of animals, birds, and insects are continued. This work should be done in connection with the lower classes. The object is to learn to name at sight the animals with which the pupils come into contact.

Continue the studies with a particular group of birds as suggested in the September outline. (For a list of the groups of the more common birds in the South and the individual birds in each group, see Appendix.)

The month by month study of a particular group of wild mammals as suggested in the September outline should be continued.

The insects and fungus diseases studied in September should be continued. The same general suggestions serve for the work of this month.

New assignment.—Take up at this time the study of the grain weevil in corn and the dry rot of sweet potatoes.

Have members of the class bring to school ears of corn and samples of peas attacked by the weevils.

Examine the grains of corn (1) to note the damage done, and (2) to determine the density or firmness of the grains. Are the varieties prolific or large-eared or both? What variety seems most subject to the attack of the weevil? Do the farmers whose corn is attacked by weevils fumigate their cribs with carbon bisulphid?

Have members of the class bring to school sweet potatoes affected with dry rot. Examine them (1) to note the outside appearance, (2) the inside appearance, (3) the odor, and (4) the varieties affected. Are there any varietes not affected?

Seed potatoes should be carefully examined before being stored and then again before being bedded for the purpose of removing all those that are diseased. Dry rot is caused by a germ and the potatoes should be dipped in a formalin solution to kill the germs before being bedded in the spring.

Practical work.—Getting facts with regard to birds, wild mammals, insects, and fungus diseases afford abundant practical work. All facts ascertained should be recorded in the class notebook. Separate books should be used for birds, animals, insects, and fungus diseases.

Specimens of insects should be mounted and preserved for study. (See Farmers' Bul. 606.)

Correlations.—Making records of the class studies and describing insects and fungus diseases and the damages done furnish material for written lessons.

Drawing: Make drawings of weevils in different stages and the appearance of corn attacked by them. Also make drawings of potatoes showing their appearance when affected with dry rot.

Geography: If a robin nests in New York State and spends the winter in Alabama, over what States must he pass in traveling from his summer to his winter home? About how many miles apart are his two homes?

History: Have members of the class prepare a written statement of the loss sustained at each home from dry rot with potatoes. This account should include such points as, when the disease first appeared, the extent to which it has developed, the loss in potatoes each year, and what attempt has been made to prevent it. In case there is no such disease at any of the homes let the account cover the same points with reference to weevils.

Arithmetic: How many bushels of sweet potatoes have been harvested at the homes of the members of the class this month? About how many bushels had dry rot? At the present price of potatoes what is the loss to each home? To the community?

NOVEMBER.

FIRST AND SECOND GRADES.

PLANTS.

Review.—Continue the work suggested for October. Teach the pupils to recognize cone-bearing trees, such as pines, cedars, and spruces.

Assigned work.—Have each of the pupils bring to school a turnip and an Irish potato. There may be several varieties in the collection. First name the different varieties of both turnips and potatoes. Record the names of each in the class notebook with a brief description as to shape, size, and color. This exercise should not be concluded until each pupil can name at sight the different varieties of both the potatoes and turnips.

The next exercise should consist of a comparative study of the potato and turnip. Do both grow in the ground? Are both roots? One is a root and one is a stem. Which is the root and which the stem? Which has eyes? What are eyes? Buds? Do roots have buds? Do stems? What other garden plants resemble turnips? Potatoes? Why are turnips and potatoes so thick and fleshy? Why do people eat turnips and potatoes? Why do not people eat cabbage roots? Lettuce roots? Make a list of all the garden plants known by members of the class that have fleshy roots or underground stems.

Practical exercises.—Refer constantly to the instructions given in the October exercise as to caring for hyacinths. See that they are properly cared for. Studying the development of the young plants should prove interesting work for the members of the class.

Tend carefully the garden plat. If the garden is at home, the pupils should report weekly as to the work they have done, the progress the plants are making, and what disposition is being made of the matured plants.

Correlations.—Language work is provided in recording in the class book facts pertaining to studies of the month.

Drawing: Make drawings of potatoes and turnips. Each variety should be indicated by shape and coloring.

ANIMALS.

Review or continued work.—Continue to look for the arrival of birds that are (a) winter residents and (b) transients. Some transients are on the wing and others spend a little time resting and feeding. Such facts should be noted and recorded. Try to learn the names of all the new ones, both transient and winter residents. (See Farmers' Buls. 54, 456, 497, 506, and 630.)

What summer residents are still to be seen? Make a note of their absence when they disappear.

Assigned work.—For study select two or three additional birds that reside permanently in the community as suggested in the October exercises. Observe them to be able to answer the following questions:

(1) What are they eating?
(2) Where do they roost?
(3) Color of parts—head, neck, breast, wings, back, tail?
(4) Do they hop, run, or do both?
(5) How do they fly—slowly, rapidly, undulating, soaring, sailing, flapping?
(6) Character of song? Imitate.

Learn the names of all fowls at the homes of the pupils. What are little chickens, ducks, geese, and turkeys called? Grown males? Grown females? What does each kind of fowl like to eat?

Keep records in the class notebook.

Practical work.—Much of the pupils' time at home, on the way to and from school, and during rest periods must be consumed in observing the birds along the lines suggested above. Some few excursions to particular fields or woods must be made for observation. Make observations and records as indicated in the following outline:

Flicker or yellow hammer.

(1) Where is the flicker found this month?
(2) How can it be told from the field lark—color, flight?
(3) Describe the color—top of head, back of neck, throat, back, tail, wings, breast. Color and shape of head.
(4) What does the flicker eat at this season?
(5) Imitate the sound made by the flicker.
(6) Locate a conspicuous white spot. When is it seen?

Correlations.—Oral and written sentence making, based on observations with the birds, should be engaged in. Further exercises are furnished in recording facts learned about the birds studied this month.

Drawing: The birds given particular attention should be outlined. Where feathers may be had without injuring the birds, drawings should be made of them.

Reading: See Farmers' Buls. 54 and 630 for selections relating to the birds studied this month.

THIRD GRADE.

PLANTS.

Review or continued work.—With the plant population studies, special attention should be given to cone-bearing trees—pines, cedars, and spruces. Learning to recognize the different plants at sight and becoming familiar with the cones and leaves should constitute the work. Pupils of this grade should observe the fall crops to be able to distinguish young grains from clovers. They should be able to name at sight the young garden plants. Some specimens of each plant should be brought to the schoolroom for the purpose of familiarizing the pupils with them.

Assigned work.—Before the weeds and wild-flower stalks that are dying down have disappeared, the teacher and pupils should go out with a grubbing hoe and dig up and bring to school the roots of a number of those that have been studied.

Place the roots in two groups—those that are branching and thin in one and those that are thick and fleshy in another. Emphasize the fact that the roots in the first group belong to annual plants and are of no further service, and that those in the second group furnish food for a new growth the following spring. Weeds of the first group are destroyed by preventing their producing seed, and those of the second by keeping the tops and the leaves cut back so that food can not be stored up in the roots or underground stems.

Discard the first lot. Take the second lot and regroup them. Put those that have "eyes" or buds into one group and those that have not into another. Which are true roots? Which underground stems? Look for Johnson grass, poke, Canada thistle, cocklebur, jimson weed, ragweed, crab grass, and ground cherry. (See Farmers' Bul. 660.)

Practical work.—Carrying out the suggestions above outlined provides practical exercises. Fleshy roots and underground stems should be dried and mounted or stored.

Correlations.—Short written descriptions of the different kinds of roots found provide practice work in language.

Drawing: Abundant material is supplied for drawings. Young field and garden plants and the roots and underground stems found should be outlined.

ANIMALS.

Review and continued work.—Keep up the population studies.

Note and record the names of birds that leave for a warmer climate; also the arrival of new birds. Some are transients and some come to spend the winter. Do they travel in flocks or alone? What do they eat? Do they frequent woods, fields, swamps, orchards, or gardens? Begin to look for wild geese and ducks, red-winged blackbirds, robins, crow-blackbirds, junco or snowbird.

Observations should be continued for the purpose of learning the use of feathers on the different parts of the body—shedding water, warmth, flying, balancing in air or on perches, propping on trees.

New work assigned.—The horse is one of the most faithful animals, and as the cold weather comes on his welfare should be kept in mind.

A warm, well-littered stall should be provided. He should be fed, watered, and brushed with regularity. Study the horse this month to learn the following interesting things about him:

(1) In what way is the horse useful?
(2) What does he like to eat?
(3) How does he get food into his mouth?
(4) Does the horse chew his food before swallowing?
(5) How many toes has the horse? One?
(6) The horse walks on the end of his middle toe.
(7) The nail has grown all around the end of his toe—what is this called?
(8) Why does the horse wear iron shoes?
(9) What is indicated when the horse (1) points his ears forward; (2) backward?
(10) Can the disposition of the horse be told by the expression of his eye?
(11) Why are blinders put on horses?
(12) Which part of the horse lies down first?
(13) Which part gets up first?
(14) How do the horse's legs move in walking? Trotting? Pacing? Running?
(15) What is meant by saying a horse is 15 hands high?
(16) How does a horse defend or protect himself? Biting, pawing, kicking, running.
(17) Why does a horse shy? How cured?
(18) What sounds does a horse make and for what purposes?
(19) What do you think of a person who leaves his horse standing hitched in in the cold without a blanket?
(20) Compare the horse and cow as to their feet, manner of eating, and their teeth.

Continue the study with harmful wild mammals. Note the damage done to field, garden, and orchard. In each case when is the damage done—during the day or at night?

Practical work.—Watching for the coming and going of birds, studying the horse with the view of answering the questions outlined, and watching for wild mammals keep the pupils busy. Records of observations should be kept accurately in the notebook.

Correlations.—Keeping records of the month's work and short written stories covering the points outlined for the horse provide ample language work.

Drawing: Drawings should be made of the horse's foot and ear. Outline the horse's body.

FOURTH GRADE.

PLANTS.

Review and continued work.—General population studies are kept up as suggested in the other grades. Review the work assigned for October.

Study the evergreen shrubs found in the yards of the community. Have the pupils bring branches, leaves, and seed to school for study. How are these plants propagated, by cuttings or by seed? Should cuttings be made this month? Describe the leaves, the bark, the seed. Keep records of facts noted and mount leaves, stems, and seeds.

Study young plants—oats, wheat, rye, and barley. These different stalks may be distinguished by observing the attachments of the leaves to the stems. Does the base of the oat leaf have a clasp? Compare the clasps of the bases of barley, wheat, and rye leaves. Which has the largest? Barley. Which the next—wheat or rye? The clasp of which has small hairs? Wheat.

Practical work.—Providing specimens of the different plants suggested and keeping records of the facts learned with reference to them give abundant practical exercises. Pupils should care for the home or school garden plats and keep the unoccupied ground thoroughly broken or spaded.

Correlations.—Describe the attachments of the leaves of oats, wheat, rye, and barley.

Drawing: Make drawings of evergreen leaves and seeds and of grain plants showing leaf attachments.

Geography: Develop some questions on the uses of oats, wheat, rye, and barley. The following are suggestive: In what different ways are oats fed to stock? Hay? Grain? How is the grain separated from the straw? In what form do oats appear on the table? Some uses of wheat—straw? Grain? Similar questions with rye and barley.

History: Have pupils give a chronological statement of the various steps from the planting of wheat until it appears on the table in the form of bread.

Arithmetic: How many acres of oats, wheat, rye, and barley have been planted this fall at the homes of the pupils of the fourth grade? How many bushels each have been planted at all the homes of the members of the class? How many acres planted in all kinds of grain? If each acre planted in oats should yield 5 bushels more than if planted next spring, what would be the increased yield?

ANIMALS.

Review and continued work.—Classify the new birds as they arrive according to their manner of catching insects. See October exercise for directions. Keep a record of notes in the class book.

Continue the study of wild mammals to learn their methods of making provision for the winter. Many continue to provide winter supplies during this month. See October exercise for suggestions.

Assigned work.—The cottontail is one of the wild mammals that do not hibernate in winter. It feeds on grasses, clovers, vegetables, and other herbs in the spring, summer, and fall, but sometimes it is necessary for it to eat the green bark of young fruit trees in winter. Study cottontails to be able to answer the following questions:

(1) What kind of track does the cottontail make? Can you tell which way i is going?
(2) What time of day does it move about?
(3) How does it spend the day?
(4) What are the two most noticeable peculiarities of the rabbit? (Ears, hind legs.)
(5) How does the rabbit hold its ears—when resting? When startled? When not certain about the direction of the noise? When running?
(6) How does the rabbit move its head to detect a scent? Observe and explain movements of its nostrils. Note the upper lip, the teeth, whiskers—uses? Eyes—why so placed?
(7) Compare front and hind legs. How do they differ and why? Front and hind feet.
(8) Describe the coat. How does the rabbit escape being seen? What is meant by a rabbit "freezing"?
(9) What kind of nest has the cottontail? What it is it called? Form.
(10) What are some of the cottontail's enemies? How does it escape them? Do rabbits fight? How? How do they show anger? With which foot do they stamp?
(11) What do cottontails eat at this season of the year?
(12) Let some member of the class capture a cottontail in a box trap and bring it to school in a wire cage for study. Are there white rabbits at any of the homes of the community? Compare the white rabbit and the cottontail.

Spiders are engineers. They build suspension bridges, aeroplanes, and balloons. They are of great value to man since they destroy millions of injurious insects every year, such as flies, mosquitoes, bugs, and grasshoppers. There is not so much danger from their bite as is often thought. Study cobwebs in the school building and in the homes this month to learn the following facts:

(1) Is the web a sheet or a mass of crisscross tangled threads? How are the threads held in place?
(2) What is the purpose of the web? Describe the place where the spider hides.
(3) Entangle a fly or other insect in the web and watch the spider. What does he do with the fly?
(4) Imprison a spider in a small bottle. Examine carefully to note the number of legs, sections of the body, and pairs of eyes.

Practical work.—Looking for and recording facts concerning new birds and wild mammals, and studying and recording facts with reference to the cottontail and house spider give an abundance of class work.

At least one cottontail and a number of house spiders should be made captive and brought to school. Some member of the class should make a box trap and catch a rabbit for study. He should be put into a small cage made of chicken wire and brought to school. Do not keep him in captivity long. The spiders should be placed in small bottles and brought to school for study. The web can be studied either at home or at school.

Correlations.—Recording the facts outlined for the study of the rabbit and the spider and writing stories about them give interesting written exercises.

Drawing: Drawings should be made of the cottontail, its ear, front and hind foot. Representations of webs and spiders should be made.

Reading: Have the class read selections from Farmers' Bul. 496.

Geography: Some interesting facts may be brought out by developing questions similar to the following:

(1) Where does the cottontail make its home or form? (Forest, fields, gardens.)
(2) What does it eat?
(3) Does it store up food for winter?
(4) Is its home or form near to or remote from its source of food supply?
(5) What relation is there between its color and its safety? Its speed and its safety?
(6) The cottontail has many enemies and it is very prolific—is there any relation between these two facts?

FIFTH GRADE.

PLANTS.

Continued work.—Practice in recognizing at sight the various plants of the community as they appear this month should be made profitable exercises.

To become proficient in recognizing the different varieties of apples it may be necessary to continue practice in this work. See suggestions in October exercise.

Assigned work.—Special attention should be given to cone-bearing plants—pines, cedars, and spruces. How are these trees alike? Unlike? Compare them as to size, shape, kinds of bark, leaves, cones or seed balls, uses.

Select a striking pine tree and study it according to the following outline:

(1) Is it like the other pines of the community?
(2) Kind of bark—ridged or scaly?
(3) Foliage—where borne, color, number of needles in bundle. Appearance of single needle.
(4) Cone—kinds, where borne, arrangement of scales.
(5) Scale—size, shape, location of seed, means of scattering seed.
(6) How long do pine trees live? Count the rings of a pine stump or the end of a pine cut.
(7) Uses of pines—wood? Sap?

Continue the studies with the tree selected for the year.

(1) Make a new outline showing the appearance of the tree at this time. Are the leaves brown? Have some been shed and does the tree look ragged? Have the leaves been shed and is the tree bare?
(2) What has become of the seeds? How are they scattered?
(3) Make drawings and write brief descriptions covering the above suggestions.

In the far South special attention should be given to the ripening citrus fruit. Here is abundant material for a month's work comparing oranges, lemons, kumquats, and grapefruit.

Practical work.—Providing apples, bark, leaves, cones, and making observations called for in the foregoing exercises and keeping records in the notebooks furnish practical work.

Look after a school or home garden plat. Care for the crops and keep vacant ground in good condition for early spring crops.

Correlations.—Writing records and descriptions of the plants suggested for study provide language exercises.

Drawing: Outline a pine tree, a cone, a scale, a seed, a bundle of needles, a single needle.

Geography: Have pupils prepare a statement as to the locations of the different cone-bearing plants in the community. Where do the different kinds of pine grow—long-leaf, short-leaf, loblolly? Where do the cedars grow? Spruce, if any? Peculiarities of the various locations should be noted.

History: Have members of the class write statements giving the history of the pine-timber industry in the community for the past 10 years.

Arithmetic: Use the rule given on page 10 to find the number of board feet in logs of various dimensions suggested by pupils.

ANIMALS.

Continued work.—Learn the names of the new birds that come to the community this month. Do any of them belong to the particular group selected for study during the year? Continue the studies with this group. For suggestions see September exercise. (For lists of groups and individuals of each see Appendix.)

These additional facts with reference to the individual members of the group should be noted:

(1) Appearance—alert, pensive.
(2) Disposition—social, solitary, wary, unsuspicious.
(3) Flight—slow, rapid, direct, undulating, soaring, sailing, flapping.

The studies with the particular group of wild mammals is continued. Follow the suggestions in the September exercise.

Which members of the group go into winter quarters? If the squirrel group is being studied, compare the methods of hibernating of the chipmunk or ground squirrel and the woodchuck or ground hog.

Both usually live in the ground and both bore two or more openings to their burrows—one stores up food in its burrow to eat during the winter, and the other gets fat and goes to sleep.

Assigned work.—No insect is of greater economic importance to the southern farmers than the boll weevil. In a very short time it will have covered the entire area of this section. The best authorities maintain that winter is one of the most important seasons for combating this injurious pest. For these reasons it is very important that the study of insects should include some work with the boll weevil during this month.

(1) Look for the weevil (a) in cracked bolls, (b) in empty burs, (c) under trash and grasses in the field, (d) in cracks in the soil, and (e) in Spanish moss. (2) Does the weevil hibernate in the pupal stage or in the adult state? (3) Does it show evidences of being alive when found? (4) What means of destroying the weevils in such winter quarters suggest themselves—cutting and burning stalks? Raking and burning the rubbish and grass? Breaking the land? (5) Store some weevils in bottles in a cool place. Do they die during the winter? If not, note when they become active in the spring.

Have members of the class find and bring to school potatoes affected with soft rot. Study them after this outline:

(1) How does affected part appear?
(2) Can black mold be seen on the potatoes? Is this the cause of the rot? Is this the mold seen on bread?
(3) What kind of odor do affected potatoes have?
(4) Have the rotting potatoes bruised or cut places? Should bruised or cut potatoes be stored?
(5) Are there indications of "sweating" or moisture on other stored potatoes?
(6) Can soft rot be prevented? How?
(7) What varieties suffer least? Most?

Practical work.—Searching for boll weevils and potatoes with soft rot and making observations with mammals and birds as suggested give interesting practical work. Boll weevils should be examined and destroyed, and records should be made of all work in notebooks.

Correlations.—The teacher should experience no difficulty in finding ample material for written work.

Drawing: Make drawings of boll weevils, and potatoes affected with soft rot.

History: Read pages 3 and 4, Farmers' Bul. 548.

Arithmetic: If a pair of boll weevils produce a progeny of 10,000,000 individuals in one year, estimate the number that would be prevented if by raking and burning rubbish on an acre of land six hibernating insects should be destroyed. Develop problems for the areas in cotton at the different homes in the class; for the cotton acreage of the community.

DECEMBER.

(Plate IV.)

TO TEACHERS.—The accompanying calendar is a suggestion for the winter months.

FIRST AND SECOND GRADES.

PLANTS.

Review the lesson with potatoes and turnips. Observe the trees. Note their condition at this season and compare with earlier months. Teach the pupils to recognize winter evergreens such as holly, bay, laurel (ivy), mistletoe, and magnolia.

Assigned work.—There should be growing in the school or home gardens spinach, collards, lettuce, and possibly cabbage. If these plants are not found in the school garden one or more specimens of each should be brought to school for study and comparison. If different varieties are grown a sample of each variety should be brought. Direct the attention of the pupils along the following lines: (1) Examine the roots, stems, and leaves. (2) What part of each plant is used as food—roots, stems, leaves? (3) The leaves of which form compact heads—cabbage, collards, lettuce, spinach? Do all varieties of lettuce form heads? (4) How may cabbage be distinguished from collards? From lettuce? (5) How may lettuce be distinguished from spinach? (6) Have the pupils name all the garden plants that they know, the leaves of which are used as food.

Practical work.—Providing the material for the foregoing lessons affords interesting work.

Follow instructions given in the October exercise as to the care of the hyacinths.

Have the members of this grade grow some Chinese sacred narcissus or lily plants to give as Christmas presents to their mothers and friends. Observe the following directions:

(1) Have each pupil secure a glass dish or crock 3 inches deep and 6 inches in diameter.

(2) Secure two large bulbs from seed store. Cut away shallowly the hard skin at the top of the bulbs, being careful not to injure the leaf growth.

(3) Get some coarse pebbles. Put a layer 1 inch deep in the dish. Set bulbs[1] on this layer. Fill in around bulbs with pebbles until dish is filled.

(4) Put in sufficient water to cover lower half of bulbs. As bulbs continue to grow add more water. After bulbs have grown sufficiently high, fill dish each day with warm water. Pour water in gently on one side and let it flow out on the other side until there has been an entire change of water.

(5) Keep dish in warm place away from sun for two weeks, then give it abundant sunshine.

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[1] Florists often slit the bulbs vertically around the apex as if to quarter, but cut only about one-fourth of an inch deep. This is thought to facilitate flowering.

Correlations.—Language exercises may be provided by relating oral and written stories concerning the vegetables studied and the experiences with flowers.

Drawing: Outlines of cabbage and lettuce heads and leaves, and leaves of collards and spinach should be made. Drawings of the bulbs used should be made.

ANIMALS.

Review and continued work.—Continue the bird studies suggested for November. Take up one or two more of those that reside permanently in the State. Follow the outline suggested in November in making observations. All facts should be recorded in class notebook. Learn the names, uses, and kinds of feed of the farm animals of the community.

Assigned work.—Observe the junco or snowbird and record the facts learned as suggested by the following questions:

(1) Where is the snowbird seen?
(2) Does it resemble the sparrow? How?
(3) Describe as to color—top of head, back of neck, throat, tail, wings, breast.
(4) What does the snowbird eat this month?
(5) Can you imitate its sounds?

Practical work.—Spend as much time as the weather conditions will permit obtaining information called for in the studies.

Correlations.—Oral discussions and making records furnish ample language work.

Drawings: Sketch the birds that have been given special attention. Where feathers may be had without injury to birds drawings should be made of those taken from the different parts of the body.

Reading: Selections from Farmers' Bul. 630 should be read to the class.

THIRD GRADE.

PLANTS.

Review and continued work.—Population studies should be continued especially with domestic and wild evergreen shrubs and trees. Have the pupils bring to school branches of plants being studied.

Assigned work.—During this month the time of the pupils of this grade may be profitably spent studying and comparing the weed seeds collected and mounted in the fall. Use the following suggestions as a guide in learning to recognize the different weed and wild flower seeds: Note (1) the size, (2) the shape, (3) the color, (4) the kind of seed covering, and (5) special parts for use in disseminating the seeds by wind, water, and animals.

Practical work.—The work out of class should consist of locating and bringing to school branches of the evergreens being studied. Notes should be made as to the locations at which these plants are found.

Correlations.—Brief written descriptions of the weed and wild flower seeds being studied and classified should be made.

Drawing: Ample work in drawing is provided in outlining and coloring the seeds.

ANIMALS.

Review and continued work.—So far as weather conditions permit keep up population studies with birds and animals.

Look for new birds and study them after the outline suggested for previous months.

New work assigned.—The pig is one of the most important sources of animal food. A large number of them are butchered during this month; hence it is opportune to study this valuable farm animal. The following suggestions are given as a guide in making investigations:

(1) How does the pig's nose differ from that of any other animal? Uses—smelling, rooting.
(2) How do hogs fight or defend themselves? Describe the fighting teeth.
(3) Do hogs see well?
(4) What shapes are the heads of hogs—wedge? Dish-faced? Do the ears stand out straight or are they lopped? Is the wedge-shaped head an advantage to the wild hog?
(5) Observe the pig's hair. Is it thick enough to keep off flies? Why do hogs wallow in the mud? Are they naturally filthy? Do they attempt to clean themselves? When do the hog's bristles stand up?
(6) What does the hog like to eat?
(7) How many toes has the pig—true? False? Of what use are the false toes? Can the pig run fast?
(8) What uses has the pig's tail?
(9) What cries and noises does the pig make that are understood—hunger? Satisfaction? Anger? Fear? Others?
(10) Mention instances to show the hog's intelligence.

Practical work.—Practical work is provided in observing hogs and the damage done by wild mammals and making records of the facts learned. Many important facts about hogs may be learned while they are being dressed.

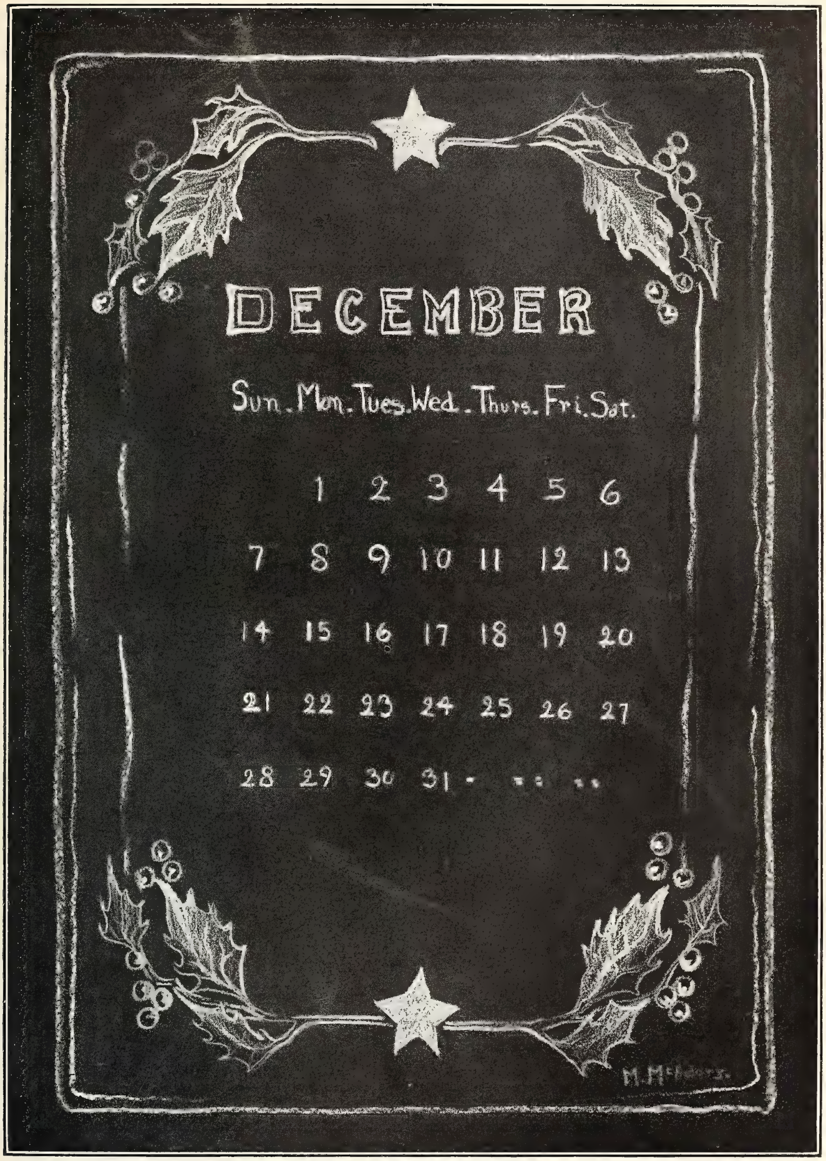
Correlations.—Have members of the class tell short stories orally and in writing concerning their observations with hogs.

Drawing: Make outline drawings of the hog showing wedge-shaped heads and dished faces.

FOURTH GRADE.

PLANTS.

Review and continued work.—The pupils of this grade should give special attention to the laurel (sometimes called poison ivy) this month. It is of considerable economic importance since its leaves contain a very active poison. Owing to its being green at a season when most plants are not, stock running in pastures or open woods



Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

BLACKBOARD CALENDAR SUGGESTIONS.

where it is found are attracted to it. Pupils should be taught to recognize the plant and remove it from pastures. The following questions suggest an outline of study: (1) Where does the laurel grow? (2) What kind of soil does it like? (3) How tall do the plants usually grow? (4) What is the shape of the leaves? The shade of green? (5) What other plant leaves are similar?

Assigned work.—The pupils of this grade should learn to prepare and "heel-in" cuttings.

(1) What is a cutting? Use?
(2) Of what part of the plant are cuttings made? Last season's growth.
(3) Name some plants grown from cuttings—grape, gooseberry, willows, poplars.
(4) How long should the cutting be? How many buds should it contain—one, two, or more?
(5) Should the cuts be made near the buds or at some distance above and below?
(6) What is the bud at the lower end for? The upper end?
(7) Should cuttings be planted in December?
(8) What should be done with them until planting time? Tied in bundles and buried in trench, bottom end up.

(See Farmers' Bul. 157, pp. 10, 11, and 12.)

Practical work.—Secure laurel branches for schoolroom study. Have pupils bring from their homes grapevine prunings to be used in making cuttings. Make cuttings from healthy last year's growth. Use sharp knife. Let each cutting have a bud near top and near base and be about 10 to 12 inches long. Tie in bundles and bury bottom end up in a trench in some corner of the school ground. Does the scuppernong grape root readily from cuttings? They may be readily propagated by "layers." What is a "layer"?

Correlations.—Language lessons are provided by brief written descriptions of the laurel and written accounts of the steps taken in preparing grape cuttings and layers.

Drawing: Require the class to make drawings of laurel leaves—attached to the branch and detached; also outlines of ideal and improper cuttings.

Geography: Develop questions as to the locations in which laurel and grapes prefer to grow. Compare these locations, showing in what respects they are alike or unlike. What lesson may be drawn from this study with reference to there being a place for everything and (if left undisturbed) everything in its place?

History: Have each pupil who brings a grapevine to the school report the name of the particular variety. Let questions be developed to show the date of introduction into the community, the uses and the relative merits of the different varieties.

Arithmetic: Have pupils of the class report the number of grapevines at their homes. Find the total number of vines and estimate the yield for each vine and the total yield in pounds or gallons (in case of scuppernong) of all vines reported.

ANIMALS.

Review and continued work.—Continue the study of birds. Watch those of the different groups classified according to their manner of catching insects, and note what the members of each group are eating. Do some of them continue to look for insects and insect eggs in the crevices of bark and under bud scales? Encourage the birds to visit school grounds by placing lunch remnants, broken grain, scraps of meat and suet at places convenient for them and out of reach of cats.

Continue the study of wild mammals that provide their food during the winter months. What are rabbits, rats, opossums, and squirrels eating this month? Where do they get their food? At what time do they go forth in search of food?

Offer some reward to the member of the class that first finds a woodchuck or groundhog burrow. Visit the burrow with the class to become familiar with the home conditions of this interesting mammal.

Employ the following outline in a study of the house mouse this month:

(1) What is the color of the mouse? Is the color an advantage?
(2) What is the nature of the coat of the mouse?
(3) The tail—length compared with that of the body; its use?
(4) Compare the front and hind limbs; front and hind feet. Can it climb the side of a wall? How?
(5) Can the mouse see well? Hear well? Smell well?
(6) What are the uses of the teeth? The whiskers? What kind of teeth has the mouse?
(7) What kind of food does the mouse eat? How does he get it? Steal?
(8) Where does the mouse make its home? Of what material? How do baby mice appear? Can they see when quite young?
(9) Mice are great travelers. How do they get from place to place?
(10) How many kinds of mice do you know?

Practical work.—Make observations with birds and mammals as suggested above. Make a trip to the home of a groundhog. Study it and take notes. Capture a mouse, imprison it in a large-mouthed bottle and study it as suggested in the outline. Keep records of all observations and facts learned.

Correlations.—Write stories about the home of the woodchuck and the habits of the mouse.

Geography: Compare the homes of the woodchuck and the house mouse as to location.

History: Read "Introduction," Farmers' Buls. 369, How to Destroy Rats, and 670, Field Mice as Farm and Orchard Pests.

FIFTH GRADE.

PLANTS.

Continued work.—Noting the appearance of familiar trees at this season and comparing their appearance with that of former months furnish interesting and instructive observation exercises.

Review the work with cone-bearing plants. Their peculiar method of bearing seed and their great usefulness make them an important group.

Continue the studies with the special tree selected for attention this year. (1) Make an outline showing its appearance this month. (2) Have the leaves been shed? (3) Where were the seeds borne the past season? (4) How have they been scattered? (5) How are the seed naturally protected from the cold?

New work assigned.—Give special attention to other evergreens, such as holly, bay, magnolia, laurel, mistletoe. Compare the bay and magnolia as to (1) general appearance, (2) character of bark, (3) shape, size, and color of under surfaces of leaves. (4) Do they appear to be related? Note the peculiarities of the holly—the leaves and the fruit. The leaves of the holly have spines and the leaves of the laurel contain poison. Of what value are these to the plants? Can animals eat holly leaves? What is the result if animals eat laurel leaves? Study the leaves, fruit, source of food of the mistletoe. Is this plant found on living, dead, or dying trees? It is called a parasite. Why?

Study the holly after the following outline: (1) Where in the neighborhood does the holly grow? (2) What is its general shape? (3) How tall does it grow? (4) What are the size, shape, and peculiarities of the leaves? (5) Does the holly shed its leaves? (6) Where are the seeds borne? (7) How are the seeds scattered? (8) Do animals or birds eat holly seeds? (9) What are the uses of the holly plant? (10) At what season is it used for decorative purposes? Why is it so highly valued for this purpose?

Practical work.—Ample practical work is provided for in making observations and securing material for study as called for in the foregoing suggestions. Make cuttings of willow twigs and store in boxes of sand and keep in cool place. Have vacant garden plats well spaded. Keep clean and in condition for early spring vegetables. Get materials together to make a hotbed for forcing early spring vegetables. (See Farmers' Buls. 255 and 647.)

Correlations.—The material for language work is abundant. Make records of the studies outlined and develop written accounts from these facts.

Drawing: Make drawings of the leaves and seeds of plants studied. Make a sketch of the hotbed.

Geography: Have the pupils prepare a statement giving the particular locations in the community at which the several plants studied grow. These statements should include the points characteristic of each locality—along streams, on lowlands, uplands, or ledges.

Arithmetic: Develop problems on the sizes of hotbeds necessary to furnish given numbers of plants.

ANIMALS.

Continued work.—Continue the studies with birds as outlined for the previous months. How the members of the bird group get their food, what they eat, and what places they frequent should constitute the principal points for consideration.

Some members of the squirrel group have gone into winter quarters. It is advisable to take up some one member of the group and devote special attention to it this month.

The following suggestive outline is offered for the study of the gray squirrel:

(1) Where does the gray squirrel make its home?
(2) Does it run or hop?
(3) How does it go up a tree? Down?
(4) How does it pass from tree to tree?
(5) How does it hold its legs and tail while jumping from tree to tree?
(6) Describe the colors of the gray squirrel above and below.
(7) Do the squirrel's colors protect it from its enemies?
(8) Locate and describe the squirrel's eyes? Are its legs long or short? Why? Compare fore legs and hind legs.
(9) Describe and give uses of the tail.
(10) What does the squirrel eat in winter? Where stored? How does it carry its food?
(11) How does the squirrel express excitement, surprise, anger, joy? Note its sounds.
(12) How does the squirrel get the kernel out of a nut?
(13) How are its teeth arranged to gnaw holes in such hard substances?
(14) Are squirrels of any use to man?
(15) What damage is done by squirrels?

Assigned work.—Have some member of the class bring to school branches of fruit trees—apple, peach, etc., known to be affected with San José (San Hosay) scale. Use magnifying glass to show both the scale and the insect body beneath it. Examine closely to become familiar with the general appearance of affected parts. Study the effect of this scale upon the manner of growth and general appearance of a peach tree. What parts are killed first? Why? Impress the following facts upon the pupils:

(1) The San José scale is an insect.
(2) Its body is protected by a scale covering.
(3) To the naked eye the scale consists of light and dark gray rings with dark spot in the center.
(4) Where abundant, scales give an ashy-gray appearance to the bark of the affected part.
(5) It is one of the most injurious orchard pests.
(6) During the winter months is the time to combat the pest, and lime-sulphur wash is the best spray.
(7) Every farm boy and girl should be able to recognize it.
(8) Burn affected parts after examination.

Practical work.—Trips to observe birds and squirrels are necessary. After members of the class have become familiar with the appearance of parts of fruit trees affected with San José scale trips should be made by the class to neighborhood orchards for the purpose of detecting the presence of the pest.

Correlations.—Written exercises on the squirrel and description of plants and parts affected with San José scale furnish language lesson work.

Drawing: Sketches of the squirrel and parts of plants affected with the scale should be made.

Geography: Have pupils of this grade prepare an outline map of the school district and indicate thereon the locations of orchards affected with San José scale.

History: Have pupils prepare written accounts covering the data of introduction, the spread and the damage done by the San José scale in the community.

Arithmetic: Have pupils report to class the number of fruit trees at their homes that have been destroyed by the scale. Develop exercises in arithmetic as to the loss sustained by the community in this way.

JANUARY.

FIRST AND SECOND GRADES.

PLANTS.

Continued work.—Studies with spinach, collards, lettuce, and cabbage should be continued. If young plants can not be obtained in the school or home garden a few seeds of each should be planted in a cigar or crayon box and some specimen plants grown for the class to study. Review the work with evergreen trees. Practice the pupils in recognizing orchard and forest trees that are bare.

Assigned work.—Under the direction of the teacher let the pupils of this grade start a window box. Observe the following directions:

1. Secure or make a box 7 inches deep, 8 to 10 inches wide, and as long as the window is wide.
2. Bore several small holes in the bottom of the box, place over these broken pottery, hollow side down, then a half-inch layer of pebbles or small stones, and cover these with an inch layer of leaf mold or fine trashy material.
3. Fill with soil consisting of one part thoroughly pulverized manure, one part garden soil, and one part sand.
4. Water thoroughly and let stand for two or three days, and add more soil if it settles.
5. When the soil becomes mellow so that it falls apart when compressed lightly within the hand it is in the right condition for planting the seed.

6. Make slight depressions with the edge of a straight board. Sow any of the following kinds of seeds: Petunias, begonias, pansies, sweet alyssum, and geraniums. If a variety is desired, sow two or more kinds.

7. Water frequently in the late afternoon and keep box indoors when the weather is very cold.

Hanging baskets may be provided in the same general way. One or more of the following plants with drooping habits may be planted: Variegated periwinkle, trailing fuchsia, wandering Jew, and oxalis.

Practical work.—Ample practical work is provided in securing boxes, preparing soil, planting seed, and watering and caring for the plants.

Correlations.—Language: Talk about the work. Write names of equipment and flowers on blackboard.

Drawing: Make a sketch of the window box.

ANIMALS.

Continued work.—Have pupils collect scraps of meat, mixed grain, and luncheon remnants for the birds. Place these in convenient places about the school yard. Study the birds that visit the grounds this month. Continue the studies with farm animals.

Assigned work.—The cardinal or redbird furnishes an interesting topic for study. The following questions suggest an outline for study:

(1) Where is the redbird seen most frequently?
(2) How do the males and females differ in color?
(3) Describe the color of each—head, neck, back, breast, wings, tail.
(4) What does the redbird eat this month?
(5) Imitate its song.

Practical work.—Make observations with a view to answering the questions in the foregoing studies. Find an old redbird nest and bring to school for study.

Correlations.—Language: Have pupils copy in their notebooks a record of the observations with the redbird.

THIRD GRADE.

PLANTS.

Continued work.—The practice in recognizing weed seeds should be continued as suggested for December.

Assigned work.—Cooperate with the second grade pupils in preparing window boxes. Pupils of this grade should arouse the interest of the parents in such work at their homes.

Practical work.—This is provided in making window boxes, mixing the soil, sowing seed, and caring for the plants.

Begin preparing the soil in the school and home gardens for the early spring planting. Apply manure broadcast. Spade or plow the soil thoroughly and make lists or beds for the seed or young plants.

Lettuce and cabbage plants should be started in the hotbed or in a box kept indoors. For the indoor box use a soil mixture similar to that used for a window box.

Correlations.—Language: Have pupils copy in class notebooks directions for making window boxes. See second grade work.

Drawing: Outline window box. Make drawings of seed.

ANIMALS.

Continued work.—Make a list of all birds seen in the community this month. They consist of two kinds, namely, permanent residents and winter residents. This list should be made as complete as possible. Compare with the list made in September. What birds are missing? What birds are found that were present in September? What new birds are found that are not in the September list? What birds were seen in October, November, and December that were not seen in September and that are not found now? Classify these groups under the following heads: Summer residents, transients, winter residents, and permanent residents.

Assigned work.—The dog is the first animal domesticated by man. In many ways he has proved a faithful friend and valuable helper to his adopted master. The fact that the dog in his undomesticated state had social instincts accounts for the ease with which he was domesticated. As a wolf the dog lived in a pack and when domesticated he readily transferred allegiance from the pack leader to his new master. Study the dog carefully this month to learn the following facts:

(1) How many useful toes has the dog in his front foot? How many useless?
(2) How many of each on the hind foot?
(3) Locate the dog's wrist, elbow, shoulder.
(4) Locate the dog's heel, knee, hip.
(5) Teeth—front or incisors, like a wedge; canine or dog teeth, long and sharp for seizing and holding prey; molars or jaw teeth, like scissors for chopping meat. Compare the dog's teeth with those of the horse.
(6) How does the dog lie down?
(7) The dog barks at his enemy or prey. Why?
(8) How is the dog enabled to follow his prey? Examine the tip of the dog's nose.
(9) Name the kinds of dogs that like to hunt; that care for flocks and herds of animals; that watch or guard premises.
(10) Does the dog make a desirable companion or playfellow? What tricks may be taught to a dog?
(11) What makes dogs fat, lazy, and stupid?
(12) Should a grown dog be fed more than once a day? What kinds of food do dogs like? How does a dog drink?

Practical work.—Listing birds and studying dogs provide ample work. All facts should be recorded in the class notebook.

Correlations.—Language: Making records called for in practical work provides sufficient written work.

Drawing: Make a sketch of a dog. Have each pupil make a sketch of the ear of his dog. Compare the drawings.

FOURTH GRADE.

PLANTS.

Continued work.—From the class notebook get a list of the domestic and wild shrubs that have been studied by the class in previous months. Examine them in their bare state and compare them with appearances when studied before.

Assigned work.—The pupils in the fourth and fifth grades should plant seeds in the hotbed to start plants for the pupils of the first five grades. Cabbage, lettuce, eggplants, and pepper seeds should be planted in the hotbed this month. Shallots and cabbage plants started in the fall should be set out this month.

Have the pupils of the fourth and fifth grades prepare the ground and sow some sweet peas. Observe these directions:

1. Select the border of the school garden or yard.
2. Spade the soil to a depth of 10 or 12 inches and loosen up the subsoil several inches.
3. Mix the soil with 3 or 4 inches of well-rotted manure.
4. Sow the seeds an inch apart in single rows. Cover 1 inch and press the ground down firmly.
5. When plants are well out of the ground thin to 3 inches apart.
6. When plants begin to run support them with brush or stakes about 4 feet high.
7. Keep soil loose and free of weeds. If soil becomes dry, water freely.
8. Cut flowers frequently to prolong the blossoming period.

Practical work.—Making observations with shrubs, seeding hotbeds, planting school gardens, preparing the soil and planting sweet peas give ample work.

Correlations.—Language: Have pupils prepare a written account covering the steps in planting sweet peas.

ANIMALS.

Continued work.—The birds to be seen this month are either permanent or winter residents. The permanent residents have been placed in one of the four groups in previous months. The winter residents, should be closely observed and classified. Answer the following questions:

(1) Of what does the bird's clothing consist?
(2) How are the feathers arranged on a hen's back? Breast? Neck? Have a hen brought to the class for study.
(3) Compare a feather from the back and from the breast.
(4) Are both ends of feathers alike? How do they differ and why?
(5) Are some feathers all fluff or down?
(6) At what age are the feathers of a bird or chicken all down? How protected from the weather at this age?
(7) What is a pin feather?
(8) How does the hen oil her feathers? Where does she get the oil? Why does she oil her feathers? Have you seen a hen or bird oiling its feathers?

What are the wild mammals doing this month? Rabbits? Squirrels? House mice? How do they protect themselves from the cold? What do they eat? What damage, if any, is being done by any of them?

Assigned work.—Collect cocoons found on oaks, hickories, and cedars. Cut some open and note the state of the insect. This is the pupa, dormant or sleeping stage. Preserve some cocoons in a bottle to note the emergence of moths in spring. Give plenty of room and have twigs in the bottle for moths to alight on. (See Farmers' Bul. 606.)

Practical work.—Make the observations and collections provided for in the preceding work and make notes in the class booklet. Ask the girls in the class to provide bottles, and the boys to collect the cocoons.

Correlations.—Language: Describe the cocoons and the appearance of the insects at this stage.

Drawing: Make sketches of feathers from the different parts of the body of the hen; of the cocoon and of the insect in the pupa stage.

Geography: Why do birds go farther south in winter, for food or for a warmer climate? What impression with reference to this question is to be had from studying the winter residents of the community?

History: Have members of the class relate superstitions concerning the screech owl. Let the teacher take occasion to decry these fallacies.

FIFTH GRADE.

PLANTS.

Continued work.—Review the studies with evergreens as outlined for December.

Continue the studies with the special tree selected at the beginning of the year. Make an outline drawing of the tree accompanied by a written description. Collect specimens of the bark. Study it and compare it with bark of related trees and those not related. Compare the drawings of the tree for the previous months with that of January.

New work assigned.—During this month the time of the pupils may be profitably spent comparing the seeds of different forest and fruit trees. These should have been collected in October and November and stored or mounted for use at this time. Note: (1) The shape, (2) the color, (3) the character of coats or cases, and (4) the kernel of the different seeds. Special attention should be given to the different kinds of acorns, chestnuts, hickory nuts, walnuts, and peach stones; also orange, grapefruit, and lemon seeds.

Practical work.—Making notes of observations in connection with the particular tree being studied and the different nuts, and copying these notes in the class notebook furnish practical work. The pupils of this grade should cooperate with those of the fourth grade in seeding hotbeds. Some early vegetables should be planted in the open. (See planting table.)

Correlations.—Language: Have members of the class write a description of one or more seeds studied, covering the points given as in the outline.

Drawing: Make drawings of the seeds and nuts studied.

ANIMALS.

Continued work.—The studies with the group of birds selected for the year should be continued. Have any members of this group gone farther south? Have others come from farther north? How are they securing their food? What are they eating? What places do they frequent?

The group of mammals selected for study throughout the year should be given attention. How do they protect themselves from the cold? What do they eat? How do they compare in these respects with other wild mammals? Compare the gray squirrel and the rabbit?

Assigned work.—The transverse borers resemble very much cotton boll weevils. They should be studied for this reason. Examine the roots of cocklebur and ragweed for this insect. Gather the roots of a number of these plants, split them open and look for the insects.

Locate and learn to identify shot-hole borers. These are found in both the outer and inner bark of peach, plum, and apple tree trunks and limbs. Their presence is indicated by small holes and gum exudation on peaches and plums. The larvæ of this insect may be removed by digging into the bark with a sharp knife at the point where the hole or gum appears.

Practical work.—Make observations and take notes on birds and mammals as suggested. Further practical work is provided in searching for and learning to identify transverse borers and shot-hole borers. Specimens of these should be preserved. (See Farmers' Bul. 606.)

Correlations.—Language and drawing: Write descriptions and make drawings of transverse and shot-hole borers.

FEBRUARY.

FIRST AND SECOND GRADES.

PLANTS.

Continued work.—Care for the window and porch boxes as suggested in the January exercise. Begin the outdoor garden work. Each pupil should have a plat either at home or at school. (See planting table in the Appendix.)

Assigned work.—Start plants in the open garden. Onion sets, radishes, lettuce, and spinach are among the garden plants that the pupils of this grade should get started this month. Such questions as the following should be asked by the teacher with reference to each plant:

(1) How planted, in rows, on beds, or broadcast?
(2) How far apart should rows be?
(3) How far apart should plants stand in rows? On beds?
(4) What quantity of seed is required to plant a 100-foot row?
(5) To what depth should seed be planted?
(6) When should the plants be ready for the table?

Sweet Williams, pansies, sweet violets, white verbenas, petunias, and zinnias are among the flowers from which selections may be made for beds and borders. The soil should be prepared and fertilized and the seed planted this month or the early part of March.

Practical work.—Caring for the window and porch boxes and preparing the soil, adding fertilizers and sowing vegetable and flower seeds provide ample practical work.

Correlations.—Language: Have pupils keep notes of their garden experiences such as kinds of seeds planted, date of planting, amount of fertilizer and such items.

Drawing: Make an outline sketch of the individual plat, also of the boards that are to be used to indicate the location of different kinds of vegetables and flowers.

ANIMALS.

Continued work.—Continue feeding birds and learning to recognize them. Be on the lookout for transients on their way back north. Note the dates on which they are seen and the manner of their flight. Do they pass on without stopping or do they tarry some time in the community? Look for the following: Wild geese, wild ducks, hermit thrush, and bobolink. Study the dog with the class, using the following outline: (1) Kind of dog at each pupil's home. (2) Name the different kinds of dogs in the community. (3) How does the dog express friendliness? Affection? Anger? Fear? Shame? Attention? (4) What should the dogs be fed? (5) What should be done to make dogs comfortable? (6) In what ways are dogs useful? Harmful?

Assigned work.—Among the woodpeckers the red-bellied woodpecker is one of the most interesting for special study. Employ the following outline in studying this or some other member of the woodpecker group:

(1) Where seen most frequently?
(2) How do the males and females differ in color?
(3) Describe the color of head, neck, back, breast, wings, and tail of each.
(4) What does the woodpecker eat this month?
(5) How does it obtain its food?
(6) Imitate its song or cry.

Practical work.—Making excursions to study and take notes on birds furnishes ample practice work. Pupils should make observations at home, on the way to and from school, and at school. These observations should be briefly noted.

Correlations.—Language: Record in the class notebook facts learned concerning the woodpecker. Also note dates on which transients are seen.

THIRD GRADE.

Continued work.—Study the plants being grown in window and porch boxes and give them proper attention. Thin the plants to a stand, carefully remove grass and weeds, water regularly, and do not permit the surface of the soil to bake. A sprinkler should be used in watering flowers.

Assigned work.—Begin planting early spring vegetables and flowers. The work suggested for the second grade applies here. Irish potatoes and English peas should also be planted.

Locate and collect specimens of weeds that are beginning to appear in yards, gardens, and along the roadway. Learn to recognize them at sight. If they can not be named send specimens to the State agricultural college for identification.

Practical work.—Care of box plants, planting vegetables and flowers, collecting, mounting, and labeling weeds furnish ample practical work. (See Farmers' Bul. 586.)

Correlations.—Language and drawing: Have each pupil make a drawing of his plat and locate and name each vegetable and flower planted. On the same sheet make a list of flowers and vegetables planted and give the dates, amount of seed, distance between plants, the depth to which planted, and the approximate date each plant should be ready for the table.

ANIMALS.

Continued work.—Review the lessons with the dog. Continue to note the migration of birds. The following are permanent residents: Flicker or yellow hammer, partridge, bobolink, mourning dove, sparrow hawk, tufted titmouse, wild turkey, cardinal or redbird, screech owl, American crow, Carolina chickadee, red-eyed vireo, white-breasted nuthatch, brown thrasher, house wren, song sparrow, chipping sparrow, English sparrow, downy woodpecker. The following are some of the winter residents: Red-winged blackbird, robin, meadow lark, purple finch, crow blackbird, yellow-bellied sapsucker, junco, red-bellied woodpecker, phoebe, towhee or chewink. Add others to each list. Note the disappearance of winter residents. Be on the lookout for transients. The following are some of the transients that may be seen this month or next: Wild geese, wild ducks, hermit thrush, wood thrush, bobolink, Baltimore oriole, ruby-crowned kinglet. Note others as well as these and record the dates on which they are seen.

Assigned work.—Have the class study the sheep this month according to the following outline:

(1) How many breeds of sheep in the community? Name them.
(2) How does the coat of the sheep differ from other animals studied?
(3) What are the enemies of sheep?
(4) Do their feet and legs enable them to escape from their enemies?
(5) Why are men sometimes referred to as following "like a flock of sheep"?
(6) Do sheep fight? How?
(7) How do males differ from females in some breeds? How does the sheep show anger?
(8) Can sheep see and hear well? How does the sheep's eye differ from the cow's? What is the position of the sheep's ear? When it is peaceful? When there is danger?
(9) Does the sheep chew its cud like a cow?
(10) Why does the lamb have such long legs? What becomes of the lamb's long tail? How does the lamb play?
(11) How much of the sheep's language is understood? Imitate.
(12) What do sheep like to eat?
(13) For what purposes are sheep kept—wool, meat, milk?
(14) What animal is used sometimes to guard sheep? Have the pupils of the class seen a collie?

Practical work.—Noting and recording facts with reference to the migration of birds and studying sheep as suggested in the foregoing outline provide ample practical work.

Correlations.—Language: Make a list of the different breeds of sheep found in the community in the class notebook. Also record the facts learned about sheep.

Drawing: Clip from farm papers and other sources pictures of different breeds of sheep, paste them in the class notebook and label them. Make a sketch of a sheep.

FOURTH GRADE.

PLANTS.

Continued work.—The garden work should be kept up. Transplant cabbage, lettuce, and eggplants; sow turnips, radishes, spinach, and carrots; and plant Irish potatoes and onion sets. The soil should be thoroughly prepared and well fertilized. Vegetables with small seed should be planted on a ridge or bed.

Assigned work.—With the assistance and direction of the teacher pupils of this grade should set plants for a permanent screen. The help of older pupils should be secured, but let it be the enterprise of this class. The snowball makes a beautiful screen for unsightly places. If the school grounds are not inclosed, secure California privet plants and set them this month. Make a ditch around the school grounds 10 to 12 inches deep and 12 inches wide. Fill the ditch half full of a mixture of manure and soil. Set the plants in single or double rows 12 inches apart. Finish filling in with soil to the depth that the plants stood in the nursery.

Practical work.—The work provided for in the foregoing directions should be done either after school hours or on the weekly holiday. If it is desired to set a privet hedge, one or more of the patrons should be invited to contribute the manure and haul it to the school yard. If the school yard is quite large, one of the patrons should bring a turn plow along with which to make the excavation for the plants. The pupils of this grade should be required to take notes on the several steps in the planting process.

Correlation.—Language: Develop the foregoing notes and copy them in the class book.

Drawing: Make a sketch of a privet plant showing roots, stem, and branches.

Arithmetic: Develop problems as to the number of privet plants required to make a hedge around the school yard; also as to the cost of the plants.

ANIMALS.

Continued work.—The study of birds and wild mammals should be kept up as suggested in January. What is "ground-hog day"? Continue collecting and studying cocoons. Store them for observation and study.

Assigned work.—Twig girdlers puncture and lay eggs in small twigs and then girdle the twig so that it breaks off and falls to the ground. Have pupils look for twigs of hickory or pecan trees lying on the ground or hanging on the trees. Note how they have been cut off. Examine the twigs close to the buds to find small punctures. Cut away the bark and determine whether there is an egg or grub present. All twigs lying on the ground or hanging on the trees should be removed and burned during the winter.

Look under the bark of dead or dying pine trees for pine weevils, bark-beetles, and sawyers.

Practical work.—Studying and making notes on birds and mammals, and looking for cocoons and twigs provide outdoor work. A number of twigs should be brought to school to study in class. Place punctured parts in a bottle and watch developments.

Correlations.—Language and drawing: Make a sketch of a punctured twig and the egg of grub found. Accompany the drawings with a brief description covering such points as the appearance of the girdled end, the location and appearance of the puncture, and the appearance of the grub and egg.

Geography: Compare the ways in which insects, birds, and wild mammals spend the winter. Some go to sleep, others migrate to a warmer climate, and still others remain active. Give reasons.

FIFTH GRADE.

PLANTS.

Continued work.—The study of the special tree should be kept up. Special attention should be given to the buds. Note the arrangement on the stem, the outer coverings, and the sizes of buds. Note the condition of the buds of different sizes. Are some swelling? Make notes of all observations.

Assigned work.—The pupils of this grade should assist the fourth-grade pupils with their practical work. The gardens should be started either at home or at school. (See planting table in Appendix.)

During the month of February shade trees should be planted on the school ground. Under the guidance of the teacher and with the help of other pupils the fifth-grade pupils should assume the responsibility of this project. Among the trees that make good shades are silver maple, water oak, live oak, and weeping willow. (See Farmers' Bul. 134, for planting directions.) Trees for shade and decoration are of so much importance to the school yard that the pupils of this grade should plan an Arbor Day. The twenty-second day of February is an appropriate occasion. Secure the cooperation of the patrons and make it a community affair. Let a part of the day be devoted to the rendering of an appropriate program of exercises.

Practical work.—Gather twigs of the special tree for study in the class. The garden work consists of preparing and fertilizing the soil, sowing seeds, and transplanting the vegetables that have been started in the hotbed. The work in the planting consists of locating and securing trees, deciding on a planting plan and securing the cooperation of friends and patrons of the school in providing fertilizers, hauling the trees, making the excavations, and setting the trees. Have pupils take notes on the various lines of work.

Correlations.—Language: Develop and copy in the class book the notes on practical work.

Drawing: Make an outline drawing of the tree-planting plan, showing the location and the name of each tree.

Geography: From what locations were the trees for the school ground secured? Did they grow on upland or lowland? Do they require much or little moisture?

Arithmetic: Develop problems on the cost of trees planted in the school yard.

ANIMALS.

Continued work.—Continue the studies with the special bird group. Note the coming and going of members of the group, their methods of securing food, the places frequented, and whether they are found in flocks or alone.

Do any members of the special group of mammals come out of winter quarters this month? The woodchuck or groundhog? The chipmunk or ground squirrel?

Assigned work.—Pupils in the extreme southern part of the country should look for the citrus white fly. It is found on the plants of citrus fruit, cape jessamine, and privet. The insect is in the pupa or dormant stage. It is oval in shape, has a thin light-green case, and is found under edges of bark. Have pupils secure specimens and bring them to school for study and identification. Store some in a bottle and note developments.

By following turnplows this month white grubs, cutworms, and beetles may be found. Pull loose bark away from stumps in fields and collect insects found there. Study to identify them. Send those that can not be identified to the State agricultural college, with the request that the name and the helpful or harmful characters be furnished. (See Farmers' Bul. 606.)

Have pupils examine seed Irish potatoes for scale and blight. The blight is indicated by the presence of brown, sunken spots on the skin extending into the flesh of the tuber. Affected seed should either be discarded or treated with formalin solution before being planted.

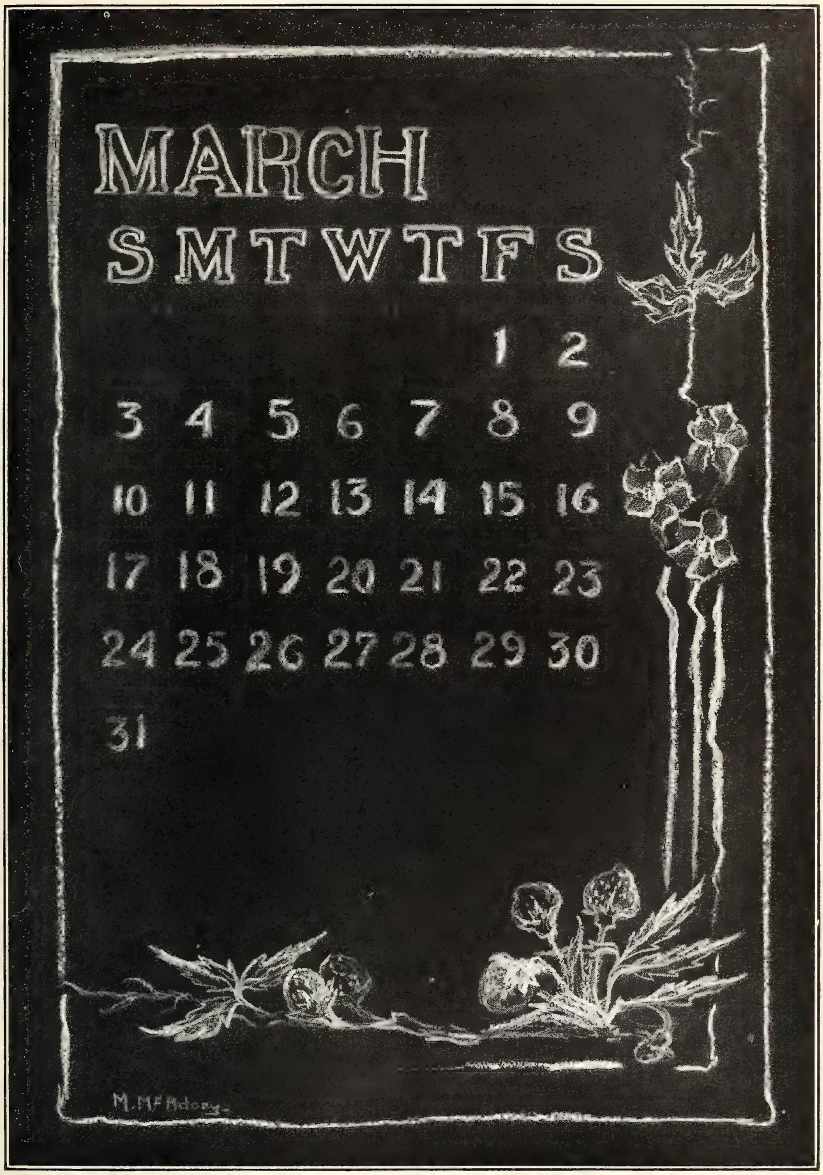
Practical work.—Take notes on observations with birds and mammals and copy them in the class notebook. Collect, identify, mount, and label insects as suggested in the foregoing studies. (See Farmers' Bul. 606.)

Correlations.—Language: Have all the members of the class write letters to the State experiment station with reference to insects being sent for identification. Select the best one and mail it.

Drawing: Make drawings and label the insects studied this month.

Reading: Have the class read selections from Farmers' Bul. 606.

History and geography: What connection has the Baltimore oriole with American history? Who was Lord Baltimore? Where did he settle? Why did he come to America? What are the colors of the oriole? What were Lord Baltimore's colors? Does this fact account for the name of the bird?



BLACKBOARD SUGGESTION FOR A SPRING MONTH.

MARCH.

(Plate V.)

FIRST AND SECOND GRADES.

PLANTS.

Continued work.—Window and porch boxes should receive careful attention. Water frequently with a sprinkler and do not let the surface soil bake. Early planted vegetables need attention. Stir the soil around the plants. See that plants are thinned to a proper stand. Continue the work of learning to recognize plants that are blooming.

Do not permit the soil of flower beds and borders to bake. As soon as the surface soil dries after a hard rain, stir it gently with a hand rake. Keep grass and weeds removed.

If any garden plants or flowers grow slowly, it will be well to make an application of liquid manure. To prepare liquid manure secure a barrel, tub or candy bucket, a fertilizer sack, and some barnyard manure. Place manure in the sack equal to one-half the capacity of the vessel used, tie the mouth of the sack and place it in the vessel. Finish filling with water. The water in a few days becomes dark brown in color. Before using it dilute to a light brown. As the liquid manure is removed add more water.

Assigned work.—Sow pepper and tomato seeds in hotbeds or boxes. Water carefully. Germinating boxes may be made by following the directions for making window or porch boxes given in the January exercise.

Have pupils bring to the class a few radish, cabbage, lettuce, and garden pea plantlets. Have them name the parts—roots, stems, leaves. Which part in each case is used for food? Why? Compare the roots, stems, and leaves as they appear now.

Practical work.—Care for the plants growing in boxes and in the gardens. Keep records of work done. With the assistance of older pupils prepare some liquid manure. If the school has not a hotbed, make a germinating box for tomatoes and peppers.

Correlations.—Language: Describe a germinating box.

Drawing: Make outline sketches of the plantlets studied, showing roots, stems, and leaves.

ANIMALS.

Continued work.—This is an interesting month with the birds. Transients are on their way north and the summer residents are putting in their appearance. Have the pupils make observations at home, on the way to school, and on the school grounds, and report the names of all birds seen this month. Have the pupils describe those that they are unable to name and assist them in naming them. (See Farmers' Buls. 506 and 630.)

Assigned work.—The robin does not nest in the South but it is of so much interest that it should be given special attention this month. It spends a few days in each State on its way north. Have the pupils study it according to the following outline:

(1) What is the color of the robin's head? Breast? Back?
(2) Where is it seen?
(3) Is it alone or in company with its fellows?
(4) What is the robin eating?
(5) Where does it obtain its food?
(6) Have the males and females the same color?
(7) Imitate its note.

Practical work.—Making observations to learn the names of birds and making special studies with the robin provide field work.

Correlations.—Language: Have pupils record in their notebooks the results of their studies with the robin.

Drawing: Have the pupils of the class sketch the robin and add the proper colors with crayons.

Reading: Read to the class How the Robin Came, by J. G. Whittier.

THIRD GRADE.

PLANTS.

Continued work.—Look after the window and porch boxes and continue planting early spring vegetables. Recognition work with weeds and wild flowers occurring in yards, gardens, orchards, pastures, and along the roadway should be kept up. Any that can not be identified should be sent to the State agricultural college with the request that they be named.

Assigned work.—The study of weeds is one of the most important phases of nature study. The pupils of this grade should become familiar with the most economically important ones. The following outline suggests a plan of study:

(1) Name the weeds found in the garden.
(2) Name those found in the home yard.
(3) Name those found in the orchard.
(4) Name those found in the pastures.
(5) Name those found along roadsides.
(6) What sort of root has each plant?
(7) Did the weed grow from an underground stem or from a seed?
(8) How is it protected from being eaten by animals? Thistles? Prickly leaves? Bitter juices?
(9) How may each plant be destroyed?

Practical work.—Collect specimens of all weeds and wild flowers found this month. Examine them carefully for identification.

Mount on cardboard and label specimens of leaves and roots. Leaves should be dried carefully between blotting paper before mounting.

Correlations.—Language: Copy carefully in the notebook facts learned about weeds. The record of each weed should include the name, where found, from what it grew, the kind of root it has, how protected from animals, how it can be destroyed, and any other facts learned about it. Learn to spell all new names.

Drawing: Make a drawing of the entire weed and separate drawings of the root and leaf.

Reading: Have the pupils read selections on collecting and mounting plants found in Farmers' Bul. 586.

ANIMALS.

Continued work.—Review the lesson with sheep. Keep up the study of migration of birds as suggested in the February exercise. Note the winter residents that are leaving, the transients that are passing by, and the summer residents that are returning. The following are summer residents: Barn swallow, blue jay, mocking bird, American cuckoo or rain crow, bluebird, humming bird, catbird, purple martin, kingbird, nighthawk, and sparrow hawk. Are there others?

Assigned work.—Have the class study the goat this month, using the following outline:

(1) Compare the goat with the sheep as to size, coat, and horns.
(2) How do goats defend themselves?
(3) Do their feet and legs enable them to escape from their enemies? What are their enemies?
(4) What facial appendage has the goat that gives it a comical appearance?
(5) Can goats see and hear well? What is the position of the goat's ears when it is peaceful? When frightened?
(6) Does the goat chew its cud?
(7) How much of the goat's language is understood? What does each particular cry indicate?
(8) What do goats like to eat?
(9) For what purposes are goats raised? Hair? Meat? Milk?
(10) What are young goats called?

Practical work.—Ample work is provided in making observations with birds and in studying the goat. Notes should be taken while observations and studies are being made.

Correlations.—Language: Write neatly in the notebook the names of all birds studied and the results of studies with the goat. Let the facts about goats be woven into a short story.

Drawing: Make a drawing of a goat. Collect any pictures that may be found and paste them in the notebook, properly labeled.

FOURTH GRADE.

PLANTS.

Continued work.—Look after the growing garden plants and continue the work of planting. (See the planting table in the Appendix.) Tomato, cabbage, and pepper seeds should be sown in hotbeds or germinating boxes.

Complete the work of setting hedges, permanent screens, and other shrubbery. List the shrubs that are blooming or putting forth leaves.

Assigned work.—What field crops are being planted this month—clover, alfalfa, oats, early corn, grasses, other crops? Answer the following questions as to each crop that is being planted:

(1) How is the seed bed prepared?
(2) How are the seeds planted—in drills, broadcast? What quantity is planted per acre?
(3) If drilled, are the seeds planted on beds or in open furrows?
(4) How are the seeds treated before being planted—inoculated, dipped in solution to prevent diseases?
(5) How are seeds planted—by hand, with seeders?
(6) Is fertilizer applied? How?
(7) For what is the crop grown—hay, grain?
(8) When will the crop be ready for use?

Practical work.—Each pupil should provide himself or herself with a pocket notebook in which to take notes on the work done in the garden and on the facts learned in connection with the plants being studied according to the foregoing outline. The pupils should make inquiry at their homes to ascertain the facts called for. These should be discussed in the class. Have the pupils bring to school a few specimens of seed being planted at their homes. Make permanent mounts of any that have not been previously mounted. (See Farmers' Bul. 586.)

Correlations.—Language: Weave into a short written story the facts learned with reference to one of the field crops. Record in the class book the facts learned with reference to the several plants studied and also the principal facts in connection with the garden operations.

Drawing: Make drawings of all seeds being planted in the fields at this time.

Arithmetic: Develop problems on the number of pounds or bushels of the seeds necessary to plant given areas.

ANIMALS.

Continued work.—The study of birds and wild mammals should be kept up. Some animals that have been in the sleeping state are now waking up and moving about. Among them are the chipmunks, woodchucks, flying squirrels, and bats.

This class has studied birds grouped according to the manner in which they catch insects. It is interesting to note what the different groups of birds are eating and how they gather food in the absence of an abundant supply of insects.

Continue collecting cocoons and storing them in bottles for study as previously described.

New assigned work.—The pupils should be taught with great emphasis the danger from flies. This is the time of year to begin combating them. Each fly destroyed now represents thousands later in the summer. All windows and doors of the house should be screened. Study the fly according to the following outline:

(1) Examine the fly's eyes. Do they appear like honeycomb? Are there a number of little eyes? Is there a dot on top of the head? This consists of three eyes.
(2) How many wings has the fly? What is the color of the wings? Are they transparent?
(3) How many legs has the fly? Examine the legs and count the joints.
(4) What is the color of the fly's body?
(5) Can you see the fly's tongue when it eats? Can you feel it when the fly eats from your hand?
(6) How does a fly clean its head? Front feet? Middle feet? Hind feet? Its wings.
(7) How does a fly carry disease? What diseases do flies carry?
(8) Where do flies lay their eggs?

FIFTH GRADE.

PLANTS.

Continued work.—A close watch should be kept on the special tree being studied by the class. Note the dates it blooms or puts on leaves. Mount and label specimens of these.

Assigned work.—Have pupils prepare a table similar to the following and fill in the facts indicated by the headings with reference to all orchard and forest trees:

Table of plant facts.

Name of plant.	Orchard or forest.	Date leaves first appear.	Date leaves become common.	Date blooms first appear.	Date blooms become common.

Have the pupils collect the following information at their homes and report to the class:

(1) What fruit trees are being sprayed this month?
(2) For what purpose are they sprayed?
(3) What sprays are used?

Record these facts in notebooks.

Practical exercises.—Preparing tables and collecting the facts called for in the foregoing lessons supply ample work for the pupils while out of the class.

Correlations.—Language: Tabulate the facts with reference to trees and write up the observations in connection with spraying.

List new words and learn to spell them.

Drawing: Make drawings of leaves and flowers that appear this month.

Geography: Note the locations of plants that are earliest in putting forth blooms and leaves. Are they on hilltops or in low places? On the south side or the north side of hill or mountain? Give reasons.

ANIMALS.

Continued work.—Continue the studies with the special group of birds. Note the coming and going of members of the group, their method of securing food, the places frequented, and whether they are found in flocks or alone.

What members of the special group of mammals are putting in their appearance? What are they eating? Are they providing summer homes? Where? What kind?

Assigned work.—The chief reason for studying the mosquito in the South is that one kind (genus) is the means of transmitting malaria. This is quite a common disease and does much to incapacitate southern people for efficient work. The idea that malaria originates in swampy or marshy places is entirely erroneous. The disease is transmitted solely through the anopheles mosquito. In most cases the disease may be controlled by the use of quinine under the direction of a physician, but the best method is to control or destroy the mosquitoes.

Have the pupils make a study of mosquitoes, at the same time emphasize the importance of keeping the home premises free from them. These pestiferous insects soon begin to put in their appearance if preventive measures are not taken. Instruct the pupils to rid their premises of all discarded tin cans, jars, buckets, and the like, drain pools of water, and fill wells that are no longer in use. Those places that can not be drained should have their surfaces covered with oil. Let the following outline serve as a guide in the study of the mosquito:

(1) Collect all the kinds of mosquitoes that can be found.
(2) Name and describe each kind.
(3) Do the males or females bite?
(4) When at rest, which kind is short and humpbacked? Which kind stands with hind legs in the air?
(5) Which kind has spotted wings?
(6) Which kind bites during the daytime? Yellow-fever mosquitoes.
(7) Why are outbreaks of yellow fever no longer common in the South?
(8) How does the mosquito transmit malaria?
(9) How does malaria affect the farm operations of the community? Would the farmers of the community be able to make larger and better crops if this disease did not exist?
(10) Get a small bottle of stagnant water containing wrigglers (wiggle-tails). Have the pupils examine these closely. These are the larvæ of mosquitoes.
(11) Why does kerosene oil poured on the surface of water kill or prevent mosquitoes?

(For information covering the foregoing outline see Farmers' Buls. Nos. 444, 450, and 547.)

Practical work.—Collect different kinds of mosquitoes and place them in bottles for study. Have members of the class bring to school small bottles of stagnant water containing mosquito eggs and wrigglers.

Correlations.—Language and drawing: Make sketches and write descriptions of wrigglers and adult mosquitoes.

APRIL AND MAY.

FIRST AND SECOND GRADES.

PLANTS.

Continued work.—Continue to care for the window and porch boxes. Plant additional vegetables (see planting table); gather those ready for the table and study plants as suggested for the preceding month. Teach pupils the names of all plants that are putting out flowers. Names of plants should be written on the blackboard and copied in the pupils' booklets.

Assigned work.—Have the pupils of this grade plan their part in the early spring vegetable show. Selecting, preparing and arranging vegetables for display provide interesting and instructive work.

It is now time to plant some of the later flowers and vegetables such as dahlias, zinnias, cosmos, peppers, tomatoes, and cabbage.

Practical work.—There is abundant work provided for in carrying out the suggestions contained in the foregoing outline.

Correlations.—Have members of the class tell about the things seen at the show this month.

Drawing: Make sketches of vegetables now ready for the table. Make simple drawings of flowers and leaves.

ANIMALS.

Continued work.—The summer birds are back home again. They have put on their new coats and are singing their sweetest songs. It is now mating time—the happiest season of the year with the birds. Soon they will be building their nests. It is an easy matter at this time to direct the attention of the pupils to bird study. Have the pupils make a list of the birds now to be seen, describe their colors and learn to imitate their notes or songs.

Assigned work.—Study the catbird according to the following outline:

(1) Where does the catbird build its nest?
(2) Is the squall of the catbird like the mew of a cat? When and why is this note used?
(3) Does the catbird imitate the songs of other birds? What other bird does this?
(4) Compare the catbird and the mocking bird as to appearances.
(5) Compare the catbird and robin as to size, shape, and color.
(6) What is the color of the catbird's head, neck, wings, tail, breast, underparts?
(7) What do catbirds eat? What places do they frequent?

Practical work.—The pupils are amply paid for the time spent in studying birds during April and May. When going out to make observations they should take notebooks and make a record of the facts learned. In taking notes on birds that the pupils are learning to recognize use the following form:

Bird notes.

Name of bird..
Where seen..
Color: Head............... Breast.............. Tail................

Correlations.—Language: Copy in class notebook the names of birds and facts learned concerning them. Learn to spell all new names. Have each pupil relate orally an experience with birds.

Drawing: Sketch a bird.

THIRD GRADE.

PLANTS.

Continued work.—Continue the work with plants as outlined for March.

Practical work.—Continue collecting, mounting and labeling specimens of weeds and wild flowers as suggested in March exercise. Make preparations for vegetable show.

Correlations.—For language, drawing and reading follow the suggestions for the preceding month.

ANIMALS.

Continued work.—By examining the notebooks answer the following questions: How many birds has the class learned to recognize this year? Name the permanent residents, the summer residents, the winter residents, and the transients.

Review the lesson with the goat. What animals has the class studied this year? Which proved the most interesting? Which does the class consider the most useful? Where there are differences of opinion have the pupils give the reasons.

Assigned work.—Require the pupils of this class to make a collection of snails, earthworms, crayfish, daddy longlegs or grandfather graybeards and spiders. Place these in bottles and tin cans. Have the pupils study these closely to be able to answer questions with reference to the parts of their bodies, their methods of moving about, how they defend themselves and what they eat and how they secure it. Many interesting facts may be learned from a study of these little animals.

Practical work.—Securing bottles and cans and searching for the small animals mentioned in the foregoing lesson provide abundant outdoor work.

Correlations.—Language: Have the pupils describe briefly each of the small animals studied.

Drawing: Make sketches of the snails, spiders, and other small animals.

FOURTH GRADE.

PLANTS.

Continued work.—Look after the growing garden plants, continue the work of planting (see planting table, p. 62), and gather vegetables now ready for the table. Have the pupils of this grade prepare their exhibits for the early spring vegetable show.

Seeds of plants providing temporary screens and backgrounds and of climbing plants should be sown. Four o'clocks and hollyhocks belong to the first group mentioned, and morning glories, ornamental gourds, and climbing nasturtiums to the second. The pupils of this grade should be encouraged to grow these plants both at home and at school.

Assigned work.—What field crops are being planted during April and the first part of May—corn, cotton, sorghum, sugar cane? What other crops?

Answer the following questions as to each crop that is being planted:

(1) How is the seed bed prepared?
(2) Are the seed planted in furrows or in beds?
(3) What quantity of seed in each case is planted per acre?
(4) How are seeds planted—by hand, with planters?
(5) What distance apart are the rows? How far apart are the seed planted?
(6) Is fertilizer applied? How? In what quantity in the case of each crop?
(7) For what is the crop grown?
(8) When will each crop be ready to harvest?

Practical work.—Use the pocket notebooks to take notes as indicated by the questions on crops. Also require notes to be taken on the work that is done in the pupil's garden plat either at home or at school.

Have pupils bring to school and mount specimens of all kinds of seeds being planted at this time. (See Farmers' Bul. 586.)

Correlations.—Language: Copy in the class notebooks the information gathered with reference to field crops.

Drawing: Make drawings of seeds being planted at this time.

Arithmetic: Develop problems on the quantity and value of seed of each kind being planted this month.

ANIMALS.

Review the lesson with flies. Continue the work with birds as to the manner of catching insects.

Assigned work.—Fleas are a nuisance and are known to carry disease. Pupils should be taught their characteristics and how to combat them. Have the pupils examine the dogs and cats at their homes for fleas. Have some brought to school in small bottles for examination.

(1) Fleas are closely related to flies. How do they differ?
(2) Explain why the flea has lost its wings?
(3) Is it due to the fact that it subsists on other animals (parasite) and does not need the wings?
(4) Have each pupil tell how fleas are combated at his or her home.

(Farmers' Bul. 683.)

Take up again the study of an ant colony. How many kinds are found in a colony? What differences are noted in size? In shape of head? In shape of body? What is the character of work done by each kind?

Practical work.—Use the pocket notebooks and take notes on the flea and the ant. Bring to school in small bottles a few specimens of each for study in class.

Correlations.—Language: Have each pupil write out detailed directions for destroying fleas.

Drawing: Make an enlarged drawing of a flea. Make drawings of different kinds of ants.

Reading: Read to the class Proverbs XXX, 24–28.

FIFTH GRADE.

PLANTS.

Continued work.—Continue the compiling of facts with reference to orchard and forest trees. Use the table suggested for March.

When the special tree being studied by the class is in full foliage make an outline drawing of it. Compare this drawing with those of previous months.

Assigned work.—The strawberry is one of the most interesting and delightful of the small fruits. Use the following outline as a guide in studying the strawberry plant and fruit:

(1) How should strawberries be planted—in rows? How far apart should rows be? How far apart should plants stand in the row? Is April a good time to plant strawberries?

(2) From what do strawberry plants grow—seeds, runners?

(3) Examine a strawberry plant in the class. What kind of root—fleshy, branching? Color of the root? How are the leaves arranged? How many leaflets in each group?

(4) Examine a strawberry blossom. How many parts are there to the hull or calyx? How many parts are there to the blossom? Is there a green button in the center of the blossom? Are the blossoms found in clusters? Do they all open at the same time? What parts of the flower fall away and what parts remain? What insects visit strawberry blossoms? In what way are they helpful?

(5) Examine several ripe strawberries. Are they all the same shape and color? What are the specks on the surface of the berry—seed? Is the berry the same color on the surface as it is within? How many kinds of strawberries are grown in the community? Name them.

Practical work.—Gather data with reference to orchard and forest trees. Bring to school strawberry plants, blossoms, and fruit for class study. Let the members of this class also join in the early spring vegetable show.

Correlations.—Language: Have the pupils write a description of a strawberry plant, including the blossom and fruit.

Drawing: Make drawings with proper colorings of strawberry leaves, flowers, and fruit, both green and ripe.

Arithmetic: Develop problems involving the number of strawberry plants, the yield, and the value of yield from a given area.

ANIMALS.

Continued work.—Continue the studies as previously suggested with the special group of birds. Are they seen in pairs? Are they preparing to build nests? Note particularly the locations at which they are most commonly seen. What do such locations afford as to natural protection? Food supply? Nesting places?

Review the lesson on mosquitoes.

Assigned work.—The 12-spotted cucumber beetle is the parent of the southern rootworm or budworm of corn. This beetle may be found most everywhere at this time. It is recognized by 12 black spots on a yellowish-green background. Have the pupils collect specimens of these in small glass bottles and bring them to school for study.

During the months of April and May the pupils should make a large collection of insects. Mount and label these according to instructions found in Farmers' Bul. 606. Those insects which the teacher and pupils are not able to identify should be sent to the State agricultural college with the request that they be named. By following this plan the pupils may become familiar with most of the insects in the community. The pupils of this class should secure the cooperation of all the pupils of the school in this campaign for a large collection of insects.

Practical work.—Abundant outdoor work is provided in the campaign for a collection of insects. For equipment, see Farmers' Bul. 606.

Correlations.—Language lessons and drawing: Make drawings and write brief descriptions of the principal insects found.

APPENDIX.

SOME GROUPS OF BIRDS.

(1) *Thrushes and allies.*—Bluebird, robin, catbird, brown thrush, and mocking bird.

(2) *Nuthatches, titmice, creepers, and wrens.*

Nuthatches.—White-breasted and red-breasted.

Titmice.—Chickadee or black-capped titmouse, long-tailed chickadee, and Carolina titmouse.

Creepers.—The brown creeper.

Wrens.—House wren, long-billed marsh wren, short-billed marsh wren.

(3) *Warblers and vireos.*

Warblers.—Blue yellow-backed warbler, Nashville warbler, Tennessee warbler, yellow warbler or summer yellow bird, black-throated green warbler, American redstart, Maryland yellow throat.

Vireos.—Red-eyed, warbling, yellow-throated, and white-eyed.

(4) *Shrikes, waxwings, swallows, and tanagers.*

Shrikes or butcher birds.—Great northern shrike, loggerhead shrike.

Waxwings.—Cedar waxwings or cedar bird.

Swallows.—Barn swallow, eaves or cliff swallow, white-bellied swallow, brink swallow, and purple swallow.

Tanagers.—Scarlet tanager, rose tanager or summer redbird.

(5) *Finches and sparrows.*

Finches.—Evening grosbeak, pine grosbeak, purple finch, goldfinch or thistle bird, snowbird or snow bunting, and rose-breasted grosbeak.

Sparrows.—Vesper sparrow or grass-finch, tree sparrow, white-crowned, white-throated, field sparrow, Savanna sparrow, chipping sparrow, junco, or black snowbird, song sparrow, dickcissel (small "field lark"), and English sparrow.

(6) *Blackbirds, crows, and jays.*

Blackbirds.—Purple grackle, bronzed grackle, red-winged blackbird, cowbird, bobolink, and meadow lark.

Crows.—Common, magpie.

Jays.—Blue.

(7) *Fly catchers, humming birds, swifts, and night hawks.*

Fly catchers.—Phoebe or pewee, kingbird, great crested pewee, least crested pewee, and wood pewee.

Humming birds.—Rubythroat.

Swifts.—Chimney swift or chimney swallow.

Nighthawks.—Whippoorwill, nighthawk or bullbat.

(8) *Woodpeckers, kingfishers, and cuckoos.*

Woodpeckers.—Ivory-billed, pileated woodpecker, hairy, downy, flicker, red-headed, and yellow-bellied sapsucker.

Kingfishers.—Belted kingfisher.

Cuckoos.—Yellow-billed, black-bellied.

(9) *Owls.*

Barn owl, short-eared owl, barred owl, screech owl, long-eared owl, Acadian or saw-whet, elf, great horned, snowy owl, and burrowing owl.

(10) *Hawks, eagles, kites, and vultures.*

Hawks.—Sparrow hawk, broad-winged hawk, Swanson's hawk, rough-legged or hew hawk, red-shouldered hawk, red-tailed hawk, sharp-shinned hawk, Cooper's hawk, fish hawk, and marsh hawk or marsh harrier.

Eagles.—Bald, and golden.

Kites.—Swallow-tailed.

Vultures.—Turkey buzzard, black vulture or carrion crow, and California condor.

(11) *Pigeons, grouse, and shore birds.*

Pigeons.—Passenger pigeon, mourning dove, band-tailed pigeon.

Partridge and grouse.—Bobwhite, ruffed grouse, prairie hen, Columbian sharp-tailed grouse, mountain partridge, California partridge, and dusky grouse.

Plovers.—Ring-neck, killdeer, and golden.

Snipes.—American woodcock, American or Wilson's snipe, gray snipe or dowitcher, marbled godwit, Hudsonian godwit, willet, greater yellow-legs, upland sandpiper.

Curlews.—Long-billed or sickel-bill, Hudsonian, and Eskimo.

Phalaropes.—Wilson's, red, and northern.

Rails.—Clapper, king, Virginia, Carolina, black, yellow croke.

Gallinules.—Purple, Florida, coot, whooping crane and sand-hill crane.

Ibises.—White, wood, bittern or stake-driver.

Herons.—Great blue, green, and great white egret.

(12) *Water birds.*

Ducks.—Mallard, black, wood or summer, whistler, old squaw, butterball, ruddy, American eider, king eider, and fish or mergansers.

Geese.—American white-fronted, snow, Canada or wild, and brant.

Swans.—Trumpeter, whistling.

Gamuts.—White and brown.

Darter.—Cormorant, pelicans—white and brown.

PLANTING TABLE.

SUCCESSION AND COMPANION CROPS FOR SCHOOL AND HOME GARDENING.

FALL AND WINTER CROPS—SEPTEMBER TO FEBRUARY 15.

Kind of vegetable.	Distance for plants to stand.		Depth of planting.	Time of planting.	Seeds or plants per 100 feet or rows.	Ready for use after planting.
	Between rows.	Between plants.				
Onions	1 to 3 feet	3 to 5 inches	1 to 1½ inches.	Sept.-Oct.	Seed, 1 ounce. Sets, 1 quart.	90 to 130 days.
Turnips	2 to 3 feet	3 to 4 inches	½ inch	Aug.-Sept.	½ ounce	60 to 80 days.
Carrots	1½ to 3 feet	3 to 4 inches	½ inch	Aug.-Sept.	1 ounce	75 to 100 days.
Lettuce	1½ to 2½ feet	4 to 6 inches	½ inch	Sept.-Oct.	½ ounce	60 to 90 days.
Radishes	1½ to 3 feet	2 to 3 inches	½ inch	Sept.-Oct.	1 ounce	20 to 40 days.
Spinach	1½ to 3 feet	2 to 4 inches	½ inch	Sept.-Oct.	1 ounce	30 to 50 days.
EARLY SPRING—FEBRUARY 15 TO MAY 15.						
Onions (sets)	½ to 3 feet	3 to 6 inches	1 to 1½ inches.	Feb	1 quart	60 to 90 days.
Lettuce	1½ to 2½ feet	4 to 6 inches	½ inch	Feb	½ ounce	60 to 90 days.
Turnips	2 to 3 feet	3 to 4 inches	½ inch	Feb.-Mar.	½ ounce	60 to 80 days.
Radishes	1½ to 3 feet	2 to 3 inches	½ inch	Feb.-Mar.	1 ounce	20 to 40 days.
Spinach	1½ to 3 feet	2 to 4 inches	½ inch	Feb.-Mar.	1 ounce	30 to 60 days.
Carrots	1½ to 3 feet	3 to 4 inches	½ inch	Feb.-Mar.	1 ounce	75 to 100 days.
English peas	2 to 3 feet	3 to 6 inches	2 inches	Feb.-Mar.	½ pint	50 to 80 days.
VACATION PERIOD—MAY 15 TO SEPTEMBER.						
Onions	1 to 3 feet	3 to 6 inches	1 to 1½ inches.	May	Seed, 1 ounce. Sets, 1 quart.	90 to 130 days.
Cabbage	2½ to 3 feet	2 to 2½ feet	½ inch	May-June.	¼ ounce	90 to 130 days.
Pepper	2½ to 3 feet	1 to 1½ feet	½ inch	May-June.	⅛ ounce	100 to 140 days.
Irish potatoes	2½ to 3 feet	1 to 1½ feet	2 to 3 inches	May	5 to 6 pounds	80 to 140 days.
Pumpkins	6 to 8 feet	6 to 8 feet	1 to 1½ inches	May	½ ounce	100 to 140 days.
Tomatoes	3 to 4 feet	2½ to 3 feet	¼ to ½ inch	May	⅛ ounce	100 to 140 days.
Beets	2 to 3 feet	3 to 5 inches	½ to 1 inch	May	2 ounces	60 to 80 days.
Parsnips	2 to 3 feet	3 to 4 inches	½ inch	May	½ ounce	125 days.

REFERENCES.

The publications referred to in this bulletin may be had as long as available by writing to the United States Department of Agriculture, Washington, D. C. The following is a list of the references: Farmers' Bulletins Nos. 54, Some Common Birds; 134, Tree Planting on Rural School Grounds; 157, The Propagation of Plants; 196, Usefulness of the American Toad; 243, Fungicides and Their Use in Preventing Diseases of Fruits; 255, The Home Vegetable Garden; 369, How to Destroy Rats; 440, Spraying Peaches for the Control of Brown-rot Scab, and Curculio; 442, The Treatment of Bee Diseases; 444, Remedies and Preventives Against Mosquitoes; 447, Bees; 450, Some Facts About Malaria; 456, Our Grosbeaks and Their Value to Agriculture; 496, Raising Belgian Hares and Other Rabbits; 497, Some Common Game, Aquatic, and Rapacious Birds in Relation to Man; 506, Food of Some Well-known Birds of Forest, Farm, and Garden; 512, The Boll-weevil Problem; 547, The Yellow-fever Mosquito; 548, Storing and Marketing Sweet Potatoes; 586, Collection and Preservation of Plant Material for Use in the Study of Agriculture; 606, Collection and Preservation of Insects and Other Material for Use in the Study of Agriculture; 630, Some Common Birds Useful to the Farmer; 660, Weeds: How to Control Them; 670, Harvest Mice as Farm and Orchard Pests; 679, House Flies. Bureau of Entomology Circular No. 34, House Ants.

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